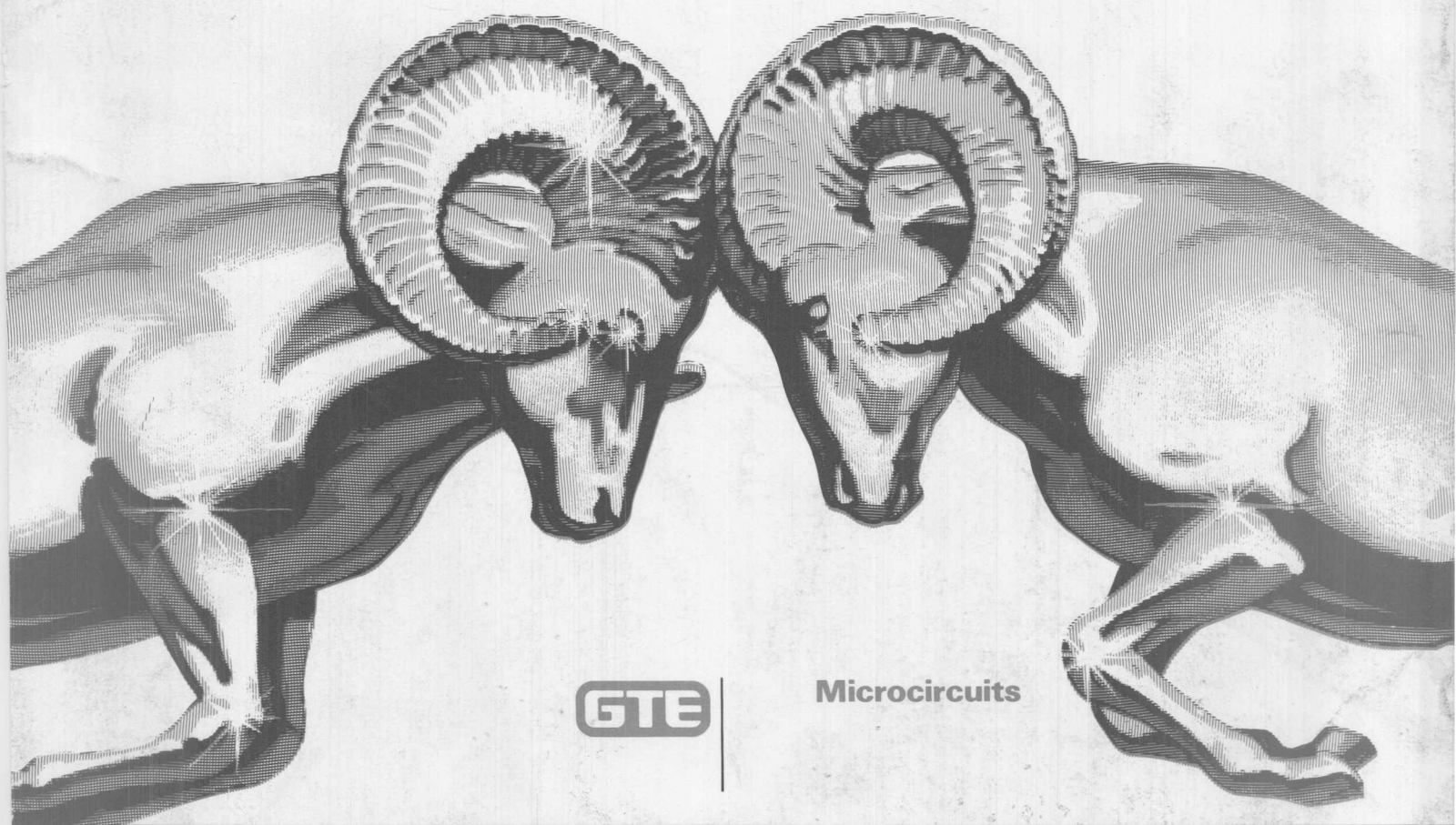


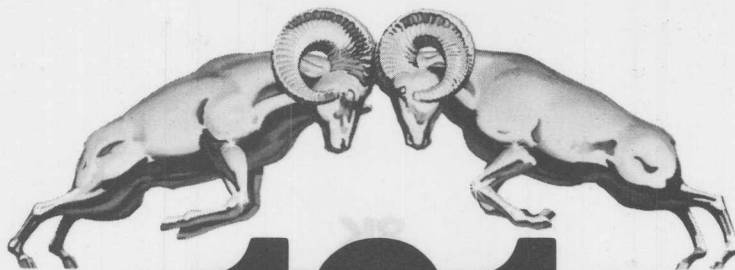
101

8K STATIC RAM SYSTEMS APPLICATIONS



GTE

Microcircuits



101

8K STATIC RAM SYSTEMS APPLICATIONS

FEBRUARY 28, 1981

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8K Static RAM Contest Systems Applications Notebook

We promised...

...a little immortality. We promised to print all the winning applications from "The Great GTE Microcircuits 8K Static RAM Contest" in a booklet at the end of the contest. We did that and a little more: this booklet contains 101 8K static RAM systems applications.

We expected entries...

...but we didn't expect the quantity we received. We did expect quality, however, and that is what we got. Easier ways to do things. Better ways to do others. New ideas we hadn't thought of. Simple answers to complex problems. You name it. In all, more than 1,200 entries. That's a lot of thought about how to use the 8114 8K static RAM.

What's it all about?

From October through December 1980, "The Great GTE Microcircuits 8K Static RAM Contest" offered the chance to win big. Or, not so big. Provided you sent us your application about how to use the 8K static RAMs. The grand prize was a GTE Sylvania Videotape Recording System with a color camera. The second prize was a GTE Supersound 25" Color TV Console. And nine prizes were awarded each month. Compact stereos with speakers and microphones. Three in each GTE Microcircuits sales area. Later, the monthly winners competed for the grand and second prizes. A copy of the official rules is included at the back of this booklet.

Cream off the top.

This booklet contains, in the opinion of the judges, the cream off the top of all the applications received. 101 of them. Of course, the 27 winners are included. You won't recognize them, though. They're mixed in with all the others. Including the grand prize and second prize winners. Then we included 74 more... almost as good but for some reason the judges didn't think they were good enough to win.

Who judged?

Not us. We've delivered more bytes of static RAM than just about anyone else, but we didn't judge those 1,200 applications for 8K static memories. Who did? A team of independent consultants. The criteria they used to judge is included at the back of this book. The decision of the judges is final.

Who says they'll work?


Not us. None of these applications have been bread-boarded, womped-up, put together, or otherwise tried out. We're offering them just like they were received. Raw. Untried. Untested. Except perhaps by the people who submitted them. But, as stated in our disclaimer on the first page of this book "...it must be the responsibility of the user to determine the suitability of... each application." We offer them for your thoughtful consideration and make no recommendation either way. Mostly, the diagrams and word descriptions are just as we received them, although in some cases it was necessary to remove certain statements that might have been misconstrued as to intent or meaning. Otherwise all we did was a little editorial housekeeping for readability.

Yours for the asking.

Everyone who entered the contest gets a free copy of this book. Anyone else can too. Just request a copy in writing from the address on the back. We'll send you a copy while they last. If we run out we'll send along a copy of our newest catalog that describes all the products we make. And with both we'll include a copy of our new specifying guide.

RAMs when you need them!

Our 2K, 4K, and 8K static RAMs are available through your authorized GTE Microcircuits distributor. Off the shelf. In prototyping or production quantities. At highly competitive prices. And with 78 distributor locations throughout the U.S. and Canada, and 22 international locations, you won't have far to go to find them. In fact, you may not even have to go out of town. For the name of the distributor nearest you, consult the list at the back of this book.

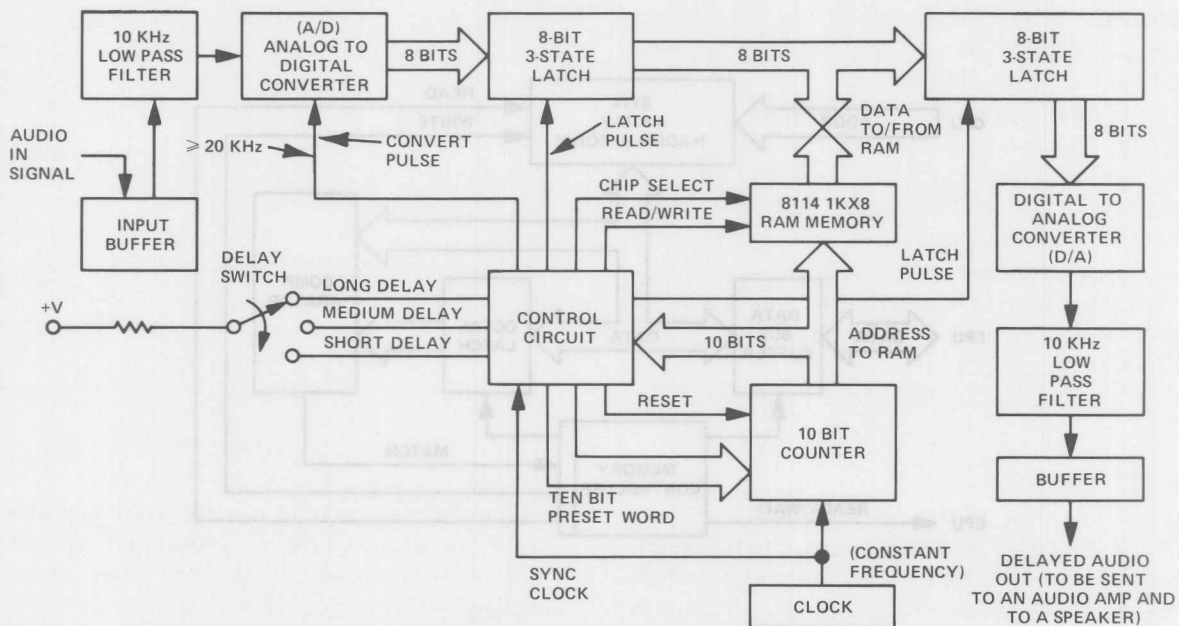



8K Static RAM Systems Applications

Variable Time Delay for Music

This application provides a variable time delay for a stereo system in which the main music is played with a delayed version to give the element of size to the listening area. A short delay equals a small room, a longer delay equals a concert hall, and a long delay is equal to an outdoor concert. The incoming signal is limited to about 10 KHz to prevent aliasing. The first

location of the 8114 is pulled out and sent to a D/A converter; the incoming signal is then digitized and written into that location of the RAM. The same procedure is accomplished with the next RAM location, and continued to the end of the RAM. The delay of the music is dictated by the amount of time taken to get through the RAM.

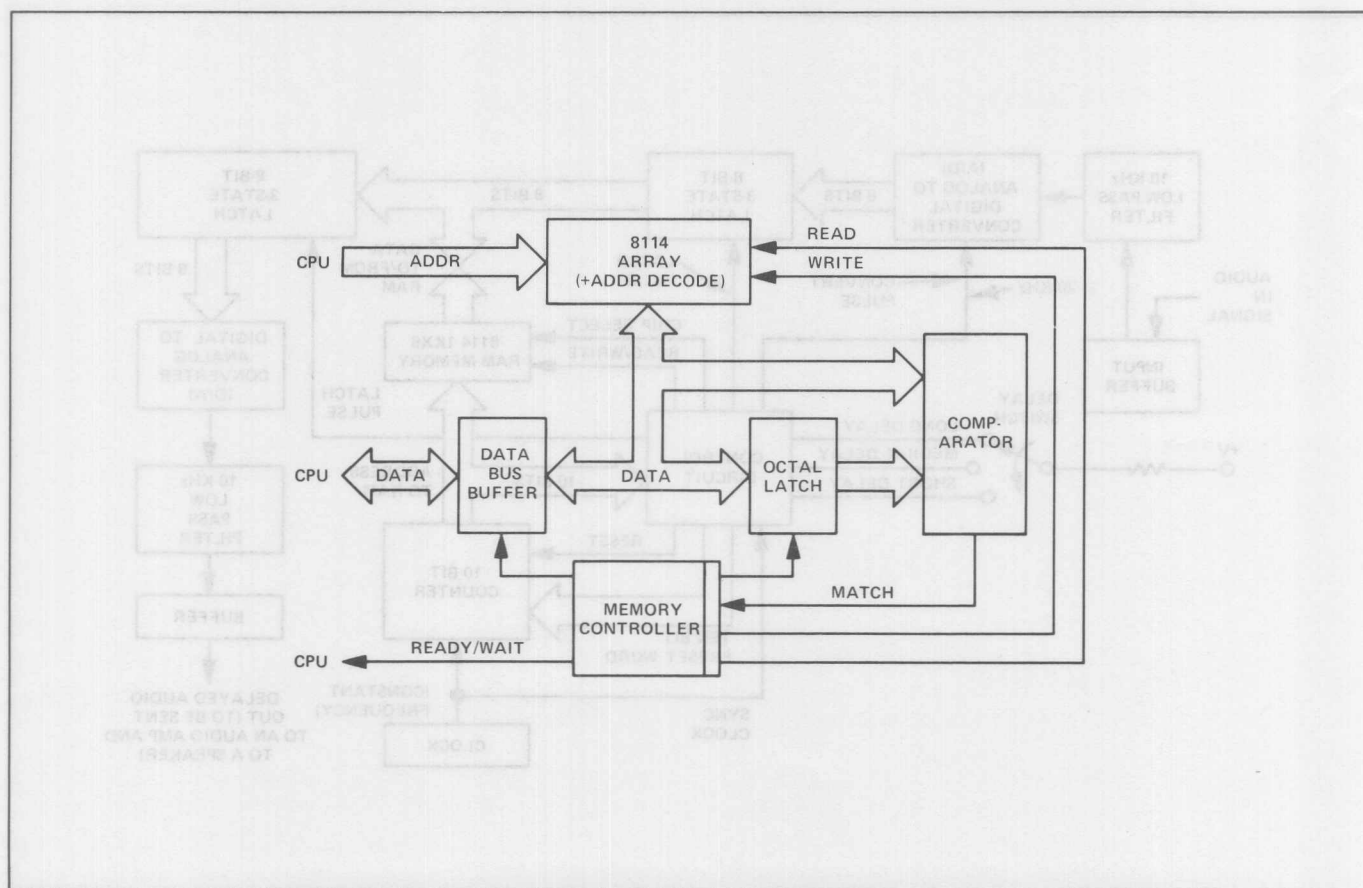


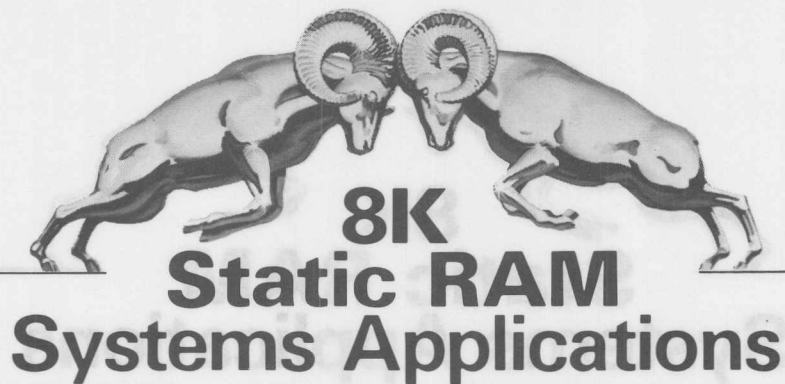


8K Static RAM Systems Applications

Computer Memory

A self-checking memory array, this application uses the ability of the 8114 to output the contents of an addressed location immediately after the location is written, without requiring the full access time. Input data is copied into an octal latch at the same time it is written to the 8114. The data from the RAM is then read and compared with the latched contents independent of the CPU. If the comparison fails, a CPU wait-state can be forced, thus allowing the memory controller to attempt the write/read cycle again.

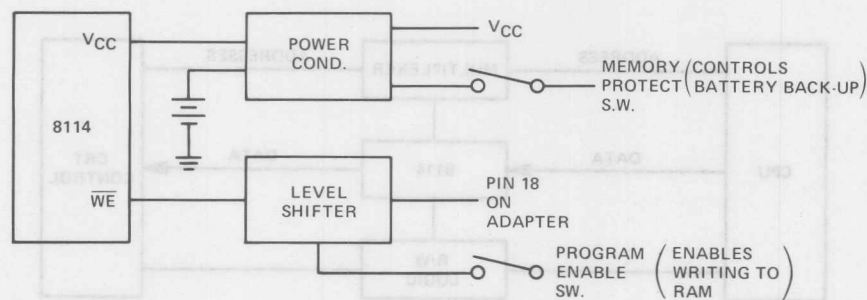





8K Static RAM Systems Applications

Development System

This application permits an 8114 RAM to be programmed like a 2758 or 2716 EPROM. The circuit is then used to simulate the EPROM in microprocessor or state machine applications. The 26 volts could not be applied to the 8114, but would be used to enable the \overline{WE} line by level shifting and inversion. Use of a PROM programmer would simplify programming the device and would permit programming an EPROM immediately thereafter. Note that some logic must be present at pin 18 to allow normal operation. All pins go directly to socket, except pins 18, 19 and 21.

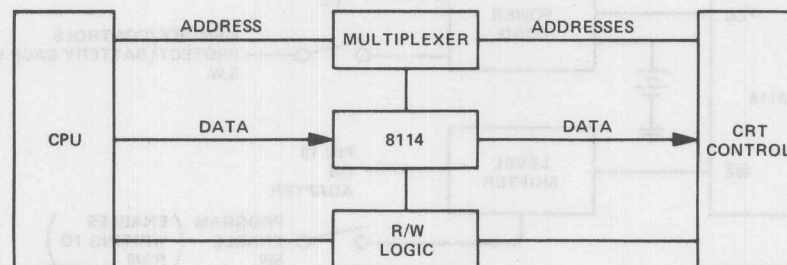





8K Static RAM Systems Applications

Terminal Application

This application uses the 8114 as a programmable character generator. A video display generator treats the RAM as a read only memory, while the CPU treats the RAM as a write only memory. The application program then can configure the display as an upper/lower case display, an upper case only with special graphics characters, or as a graphics display with 128•8x8 characters.

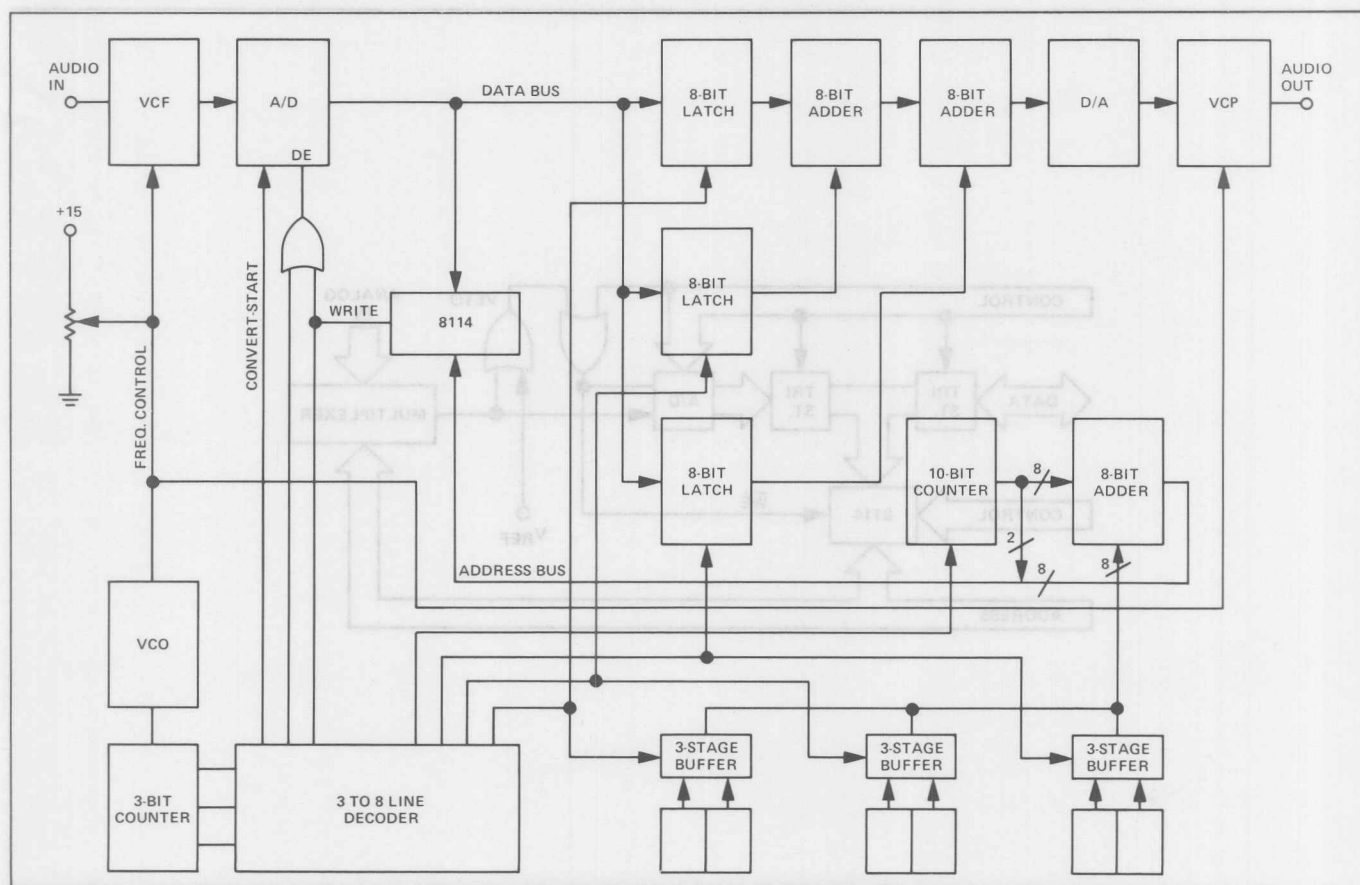





8K Static RAM Systems Applications

Digital Delay For Special Effects In Electronic Music

In this application, the 8114 is used as a 1024 stage shift register. A byte of data is written into the RAM, the address incremented by one and now points to the "oldest" byte of data. The thumb wheel switches contain address offsets and thus point to data of various "ages". This data is read, summed, and converted to analog. The process then starts all over by taking a new analog reading. The oscillator is variable from 40 KHz to 1 MHz which allows delays of 25 milliseconds for Hi-Fi and 0.2 seconds for special effects. Companding D/A and A/D converters should be used for a Hi-Fi ambience generator. Voltage controlled filters track the VCO to eliminate aliasing.

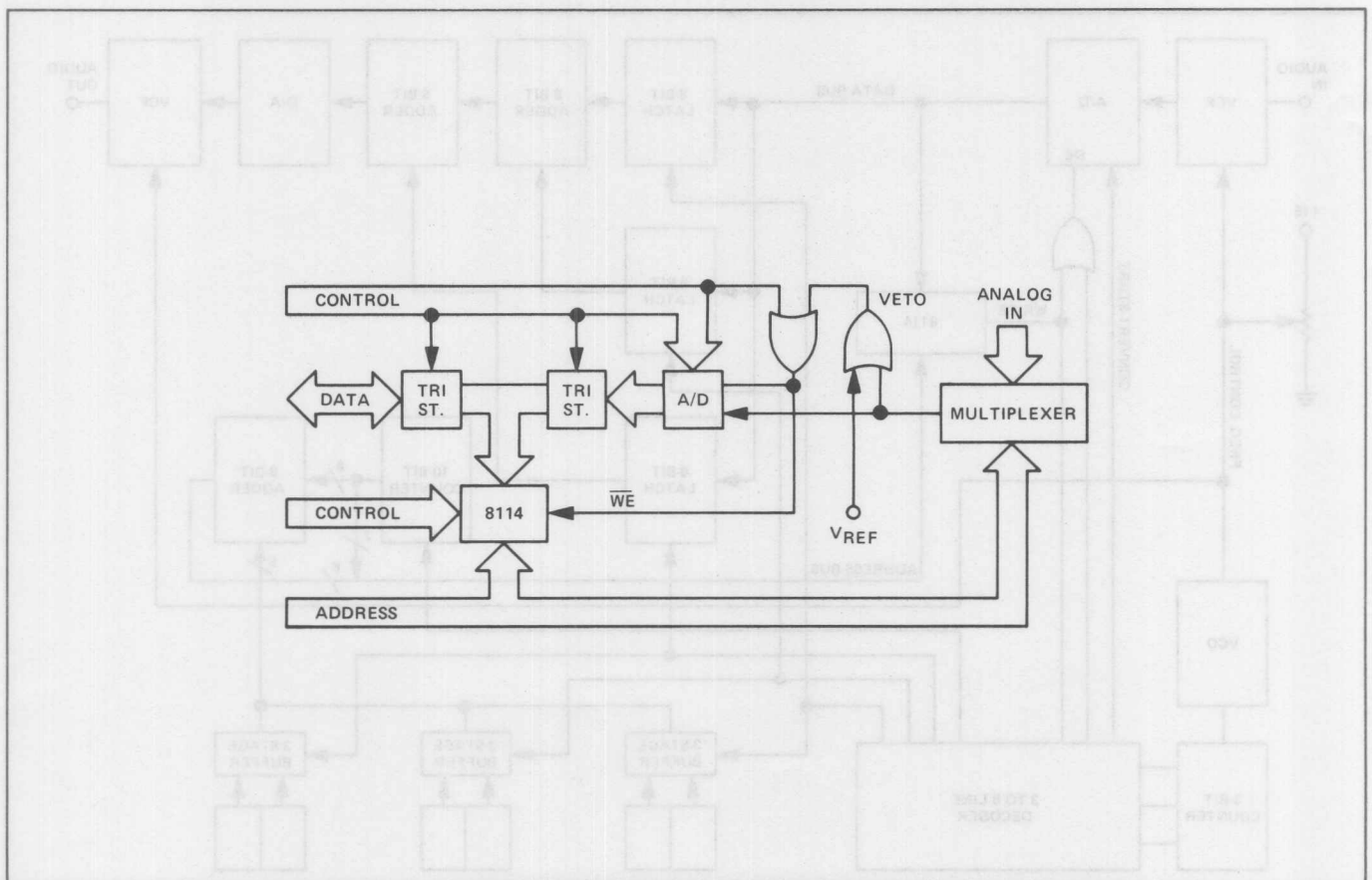




8K Static RAM Systems Applications

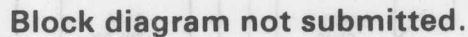
A/D Converter


This application is an A/D buffer which automatically sorts input storage according to $V_{IN} > V_{REF}$, i.e., scheduled subroutine to write data from the A/D section to the buffer uses delayed write for analog settling time. \overline{WE} is enabled only for those values greater than V_{REF} .





A video display generator such as the MC 6847 needs a 512 X 8 memory to store one raster of alpha-numerics. By using one 8114, the display system not only stores the raster pattern but remembers the previous raster for non-volatile scrolling and editing.

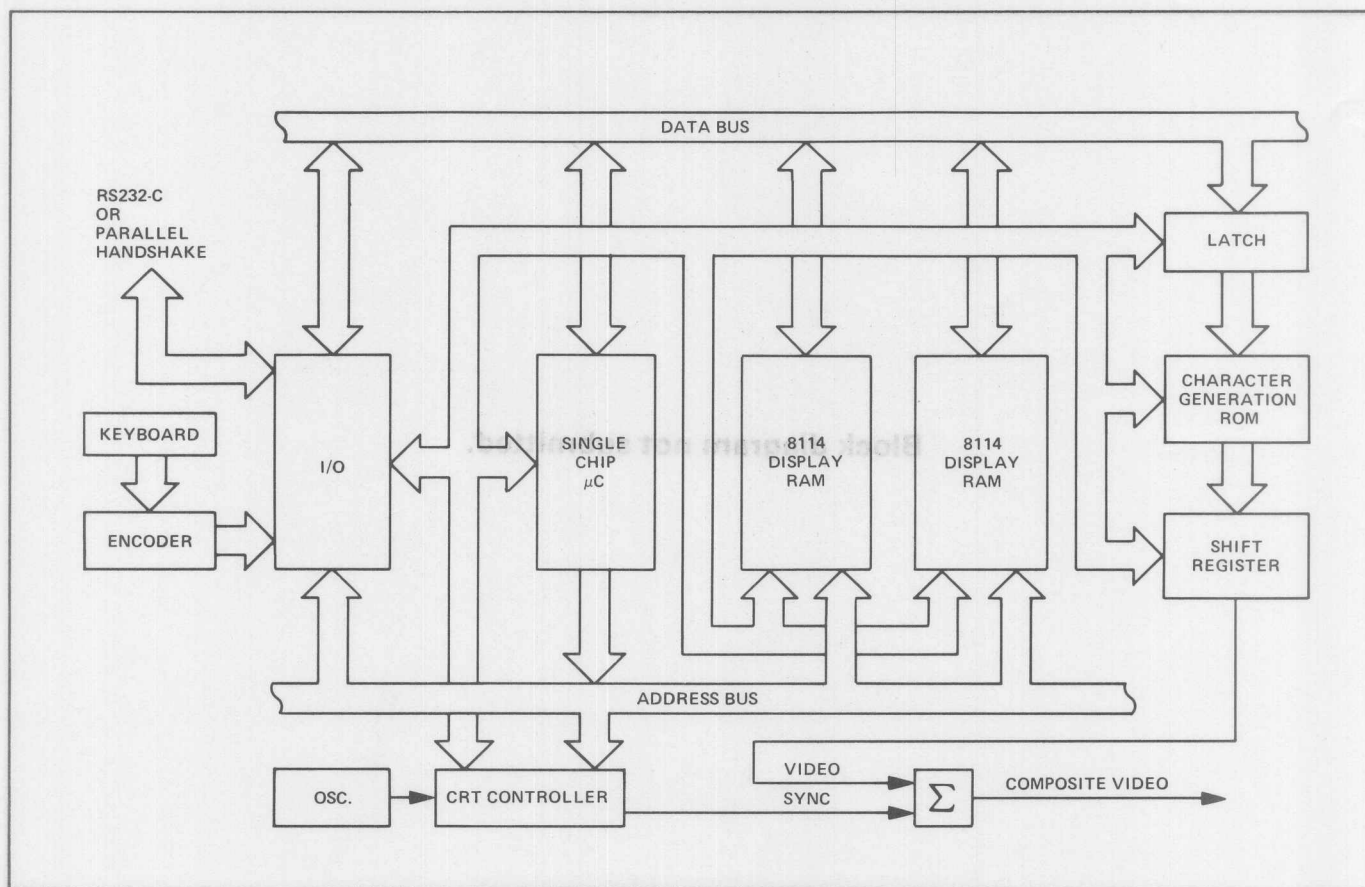





8K Static RAM Systems Applications

Terminal Application

A low cost CRT terminal can be implemented by employing several recently available LSI chips and the 8114 RAM. The system consists of a single chip computer with built-in ROM and RAM, plus a CRT controller which generates necessary video sync signals and control signals for CRT screen character generation. The RAMs in the system are used as video RAMs for CRT screen character storage. Two 8114 RAMs, providing 2K bytes of media, is sufficient for standard 80 X 24 character CRT screen formats.

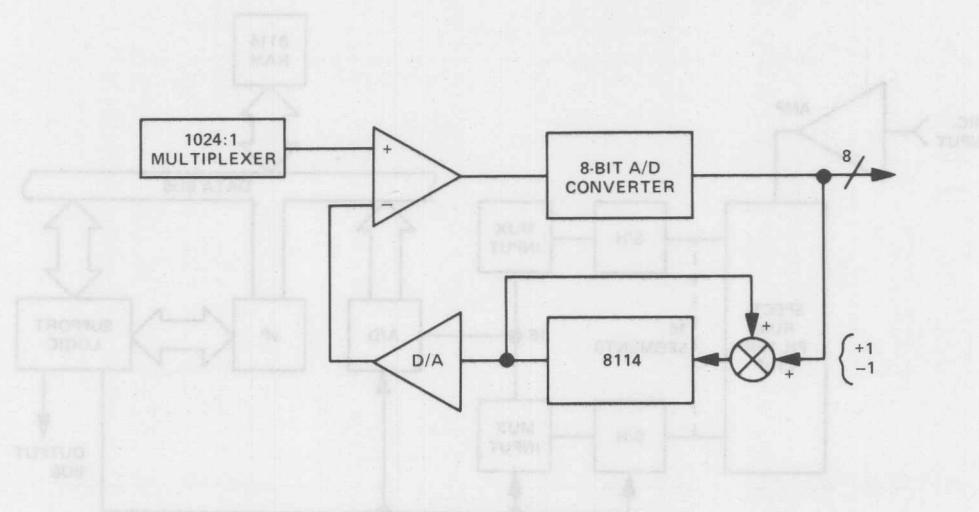





8K Static RAM Systems Applications

A/D Converter

This application is an error storage RAM for a 1024 channel analog to digital converter. In the calibrate mode, the offset error for a given channel is measured and accumulated in the RAM. In the normal mode, the previously measured offset error is subtracted from the signal applied to the A/D converter so that the output is free of error.

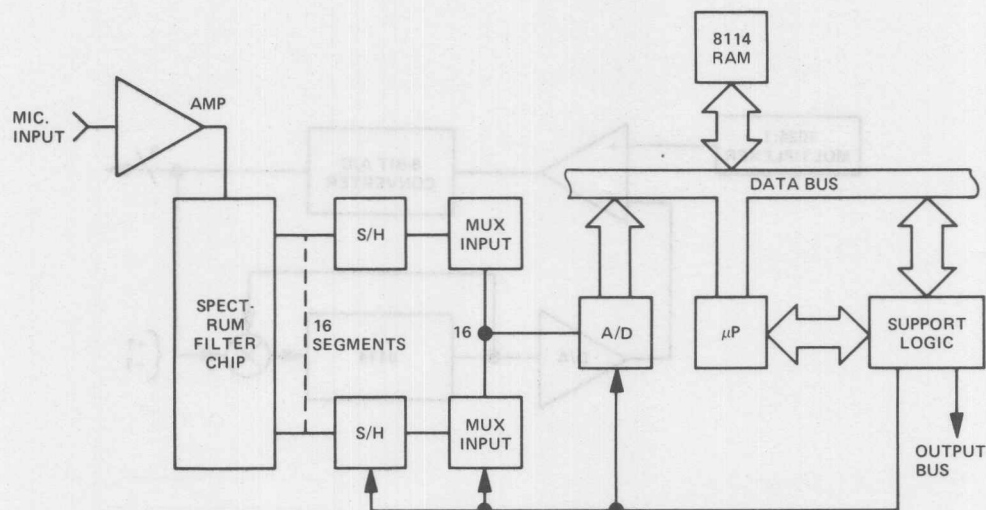





8K Static RAM Systems Applications

Interface Circuit

This application is a voice data entry single-board product with on-board byte-wide RAM adequate to support real-time entry/control of a broad range of industrial applications. The byte-wide feature would provide a compact implementation of the necessary memory for buffering and translation of the voice input into ASCII outputs of a 200 word vocabulary stored in ROM. A key feature is the compact, single-board size on an industry standard bus.



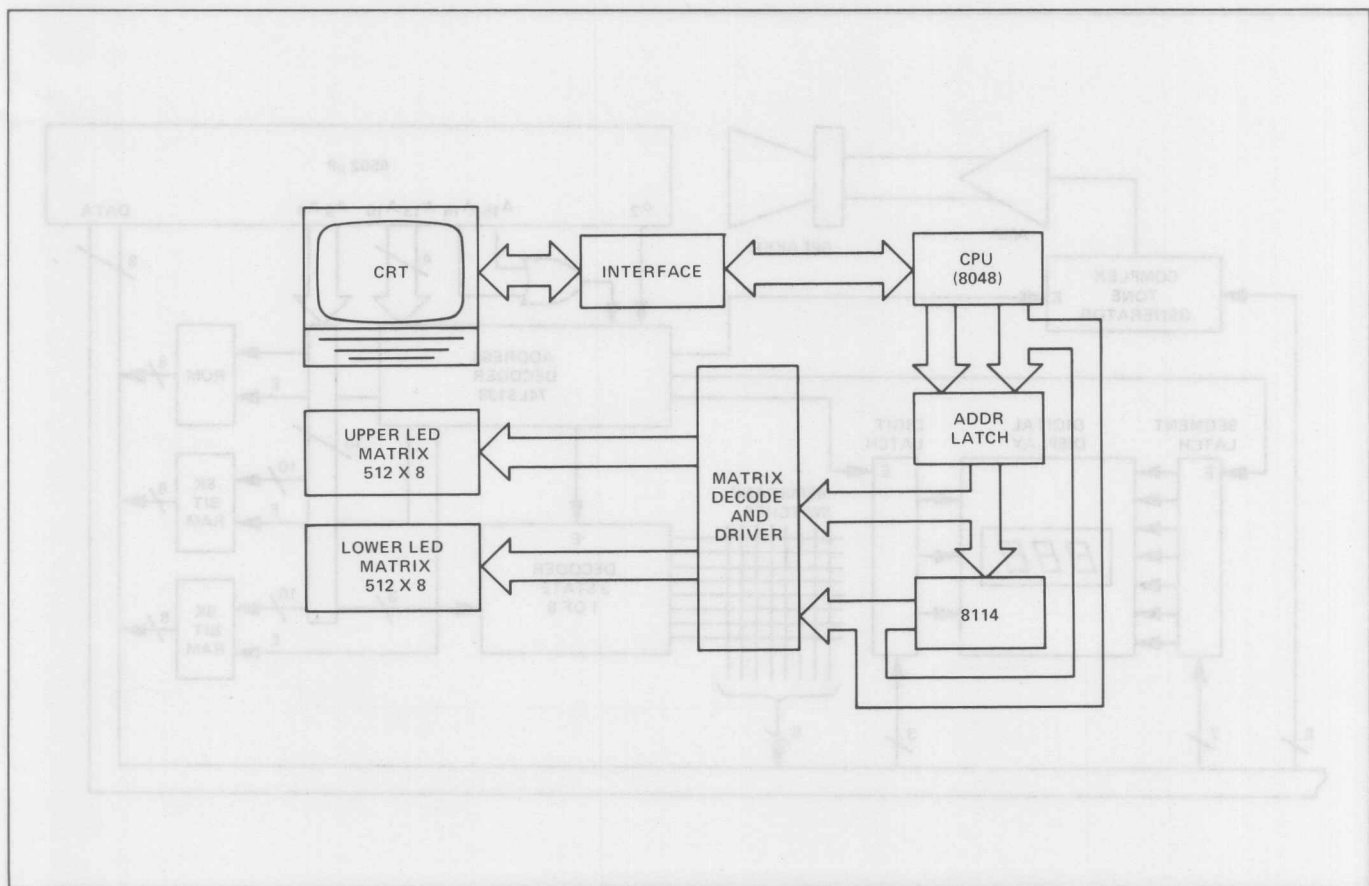



8K Static RAM Systems Applications

Electronic Sign Memory

This application provides volatile memory for an electronic sign using 512 X 16 LED's. The operator simply enters the words, letters, figures, etc. into the terminal, depresses the enter key and the program is stored into the 8114. The pattern stored in RAM will then determine which LED's turn on (a byte at a time), by having the CPU sequentially address through the

RAM. Every other address will alternate between upper and lower LED matrices. Additional 8114's can be added to provide the memory need for moving message applications. The CPU will constantly repeat the addressing sequence for refresh purposes; the LED's would be refreshed 195 times a second using 6 MHz clock on the CPU.

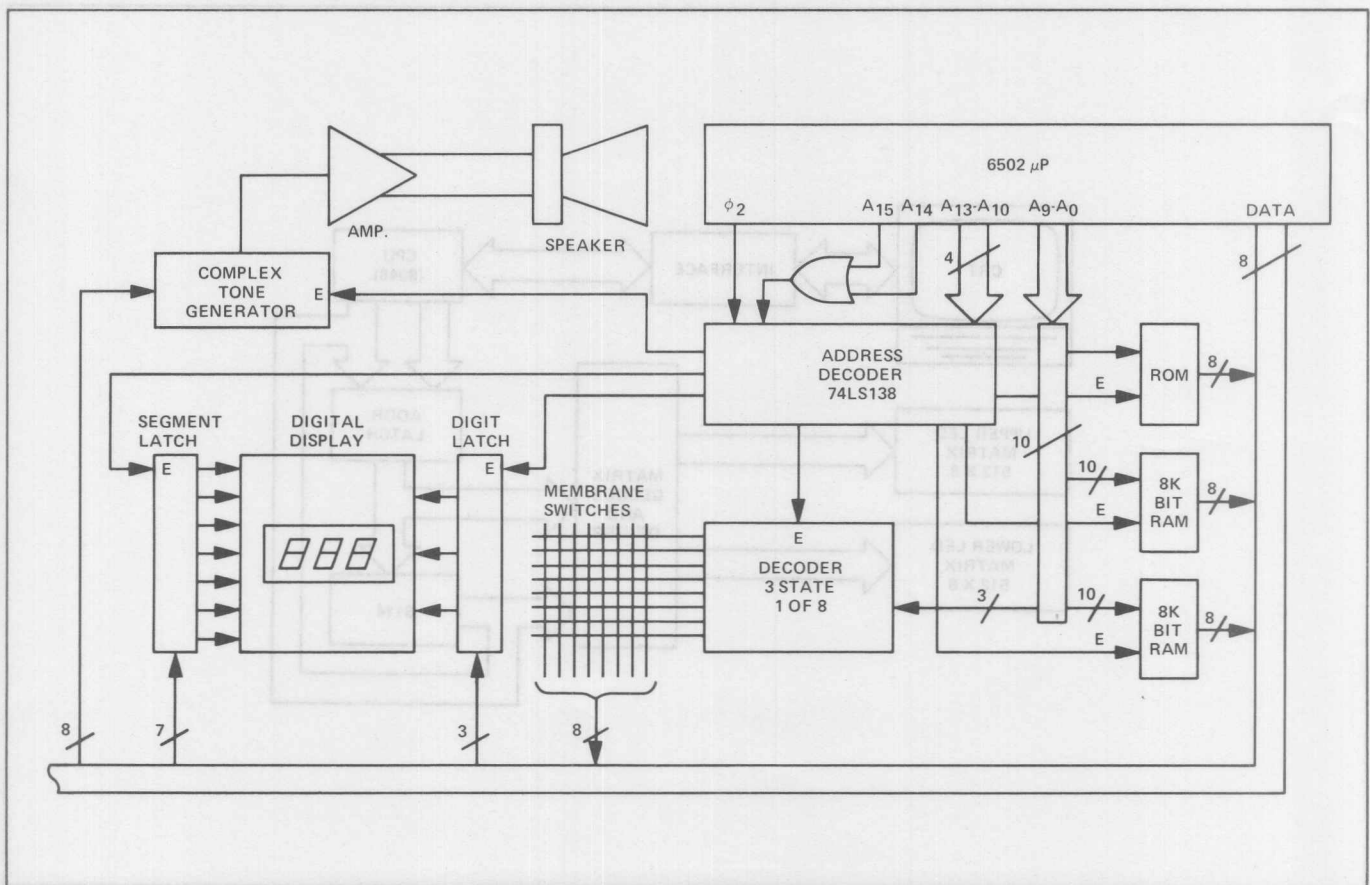





8K Static RAM Systems Applications

Programmable Music Composer

Melodies can be stored into two 8114's one note at a time by first selecting a voice and a note time and then the desired note sequence. Voicing and note time remain set until either or both of them are changed by pushing the appropriate buttons. A digital readout is provided to display program step. Buttons are provided for editing and creating program loops. A complex sound generator is used to produce the desired notes with the appropriate voice. Controller of the system consists of a microprocessor with a ROM containing the operating system software. This system could be used for either a toy or a serious musical instrument.

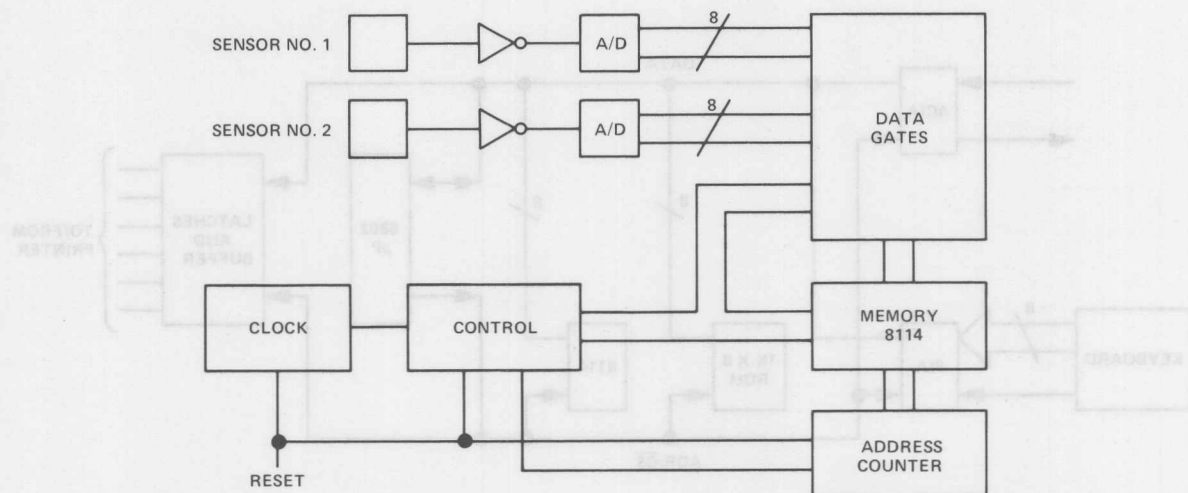





8K Static RAM Systems Applications

Data Logger

This application is for an automatic temperature logger which will sense, convert and store the temperature from two sensors, two times per day. One sensor will be buried with the logger, 48 inches below the earth surface. The second sensor will be located 48 inches above the earth surface (above snow level). All circuitry and batteries will be housed in a short section of two-inch pipe. At six month intervals, the logger will be attached to a micro-processor driven instrument which will convert the readings stored in the 8114 into readable form. This data is required by builders of earth homes.

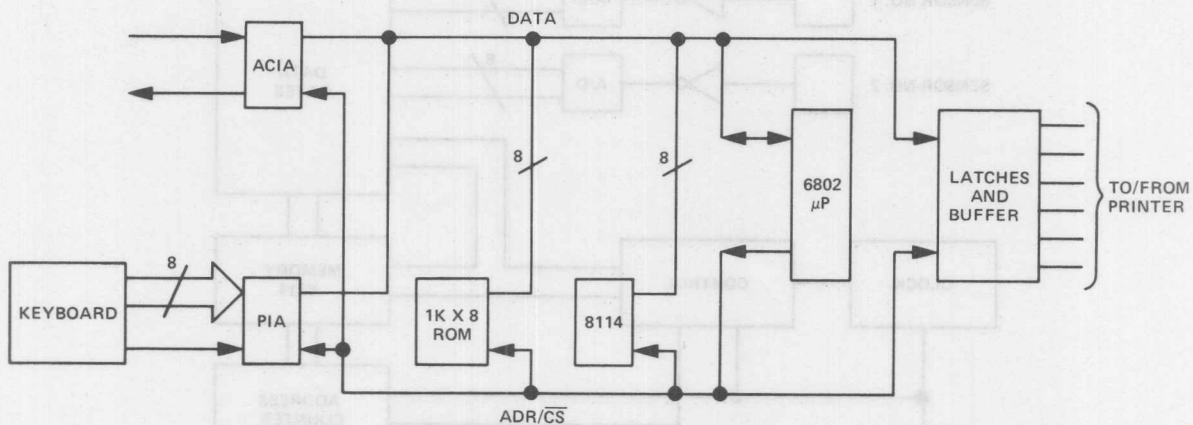


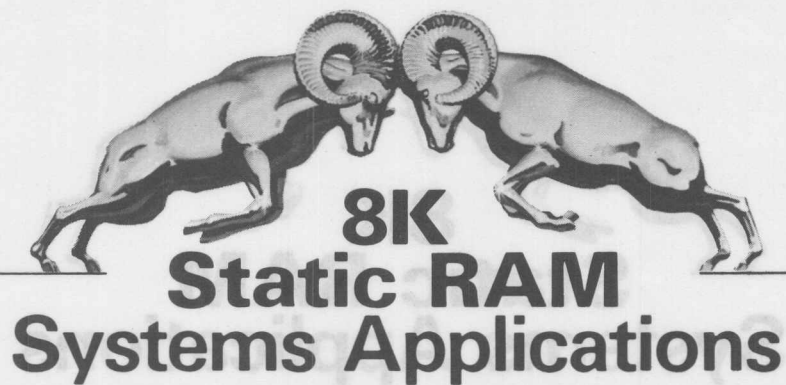


8K Static RAM Systems Applications

Terminal Application

This application is for a Hytype 1 printer driver. Using one 6802 microprocessor, one ACIA, one 1K X 8 ROM and one 8114, the complete interface between RS232/keyboard and printer can be affected. If a full 80 character line is used, approximately 13 lines can be buffered and, if spooling is used on the main computer, the impact on usage is lessened.

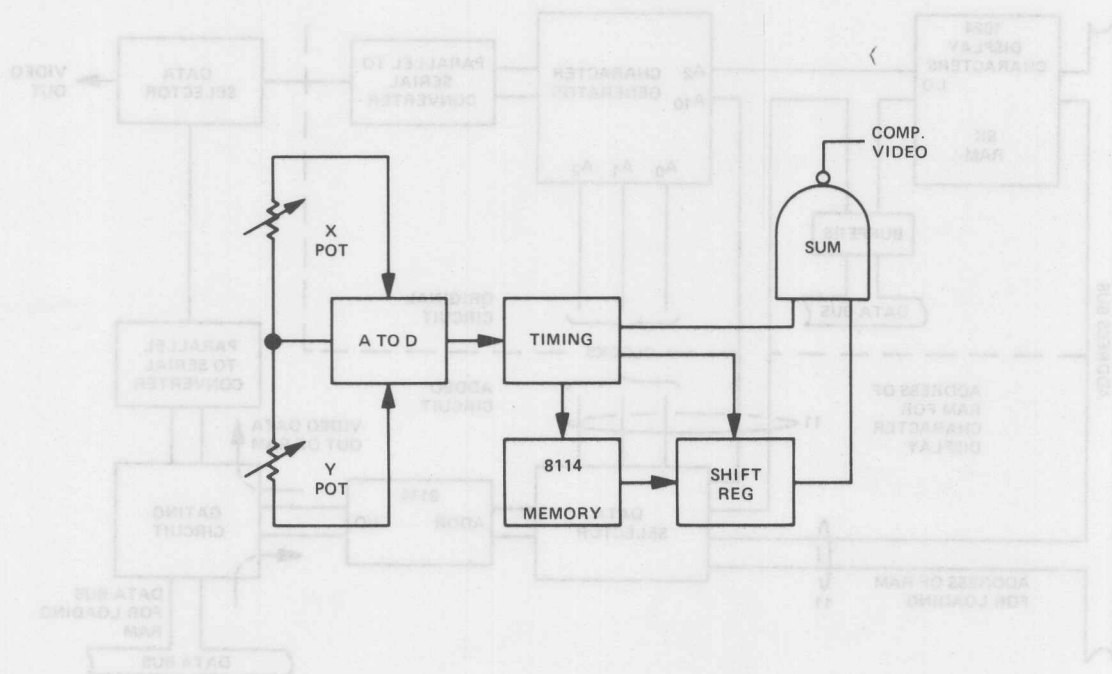





8K Static RAM Systems Applications

Computer Aided Drawing

Two pots control the X,Y direction of the graphics blocks giving control to draw electronically anywhere on the screen of any CRT. The 8114, after being shifted from parallel to serial, is the video information. The sync and video combine to make composite video signal.

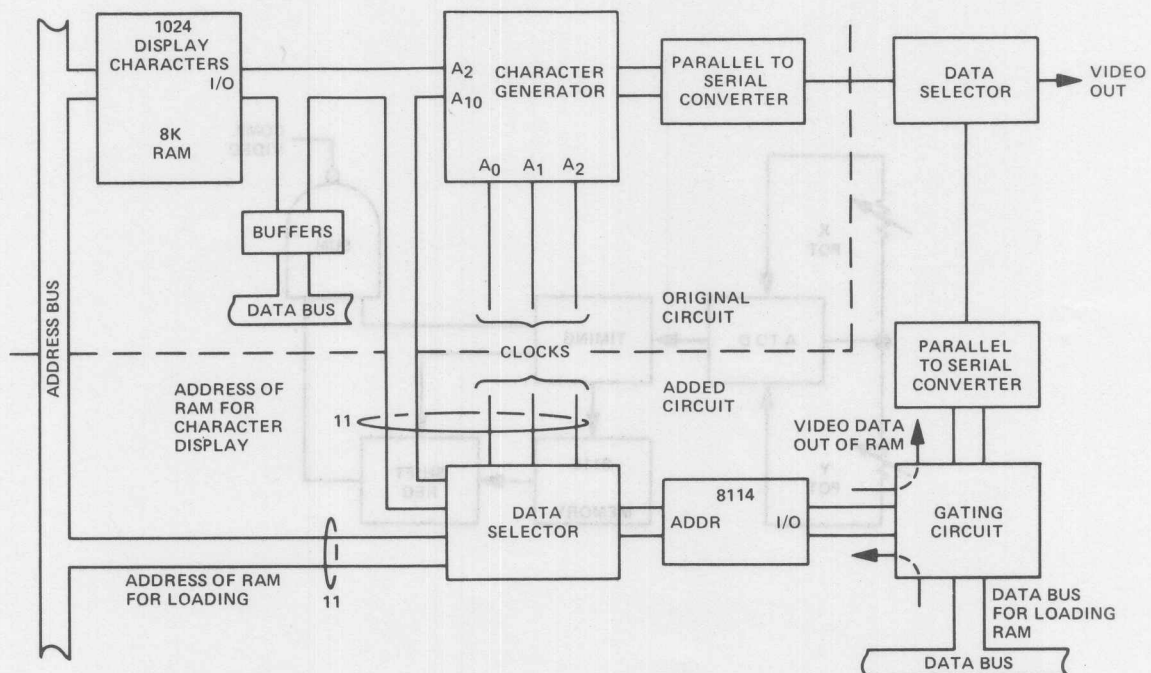





8K Static RAM Systems Applications

Home Computer Terminal

Most home computers have limited graphic capability which is determined by a character generator. By adding one 8114 RAM and some gating circuits, virtually unlimited graphics could be created. The 8114 would be loaded with graphic symbols and these symbols could be program controlled. A latch would either select the regular character generator or the RAM character generator.

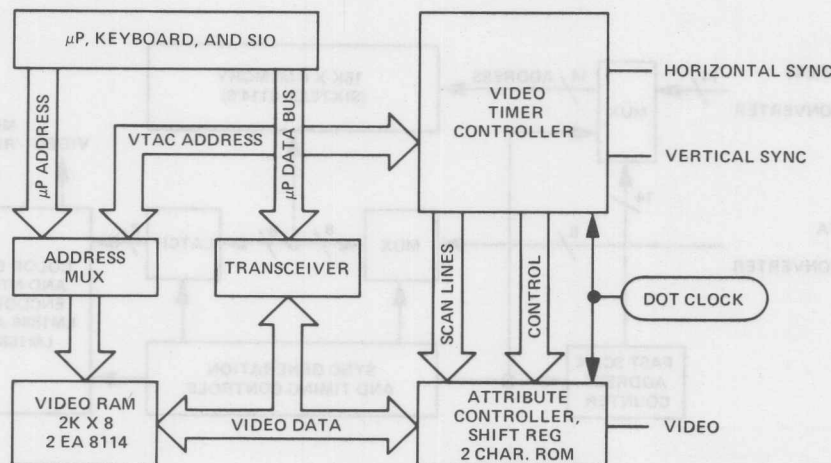





8K Static RAM Systems Applications

Terminal Two-Page Memory

This 8114 application is for a two-page memory for use with smart terminals. The memory is made dual port by adding the address multiplexer. As shown, 2K by 8 would be sufficient for two pages at 64 X 16. With four 8114s the format could be two pages at 80 X 24. This application would not only reduce chip count as opposed to the 2114 or 2102, but also simplify the layout and timing for transparent refresh. ASCII values loaded in an X-Y format would be used so that little memory waste and easy addressing would be a by-product.

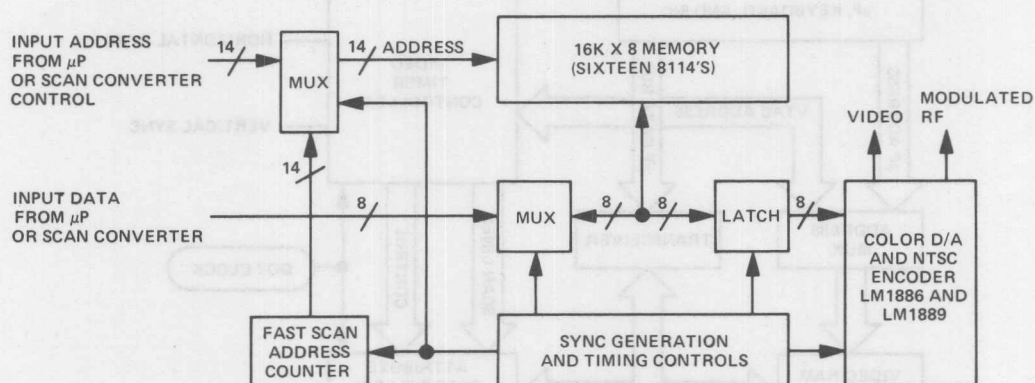





8K Static RAM Systems Applications

Color Graphics Display

This application is for a color graphics display to be used as a computer graphics terminal. It can also be used as a scan converter to convert slow scan color TV to fast scan for display on a conventional color TV set. The display format will be 128 pixels horizontal by 128 rows. Each pixel will contain 3 bits of red, 3 bits of green and 2 bits of blue information. Two bits of blue are used because the human eye has low perception to blue. The display may be increased to 256 X 256 by adding 8114s to a total of 64K. Standard NTSC or PAL encoders may be used to generate compatibility with domestic or foreign TV sets.

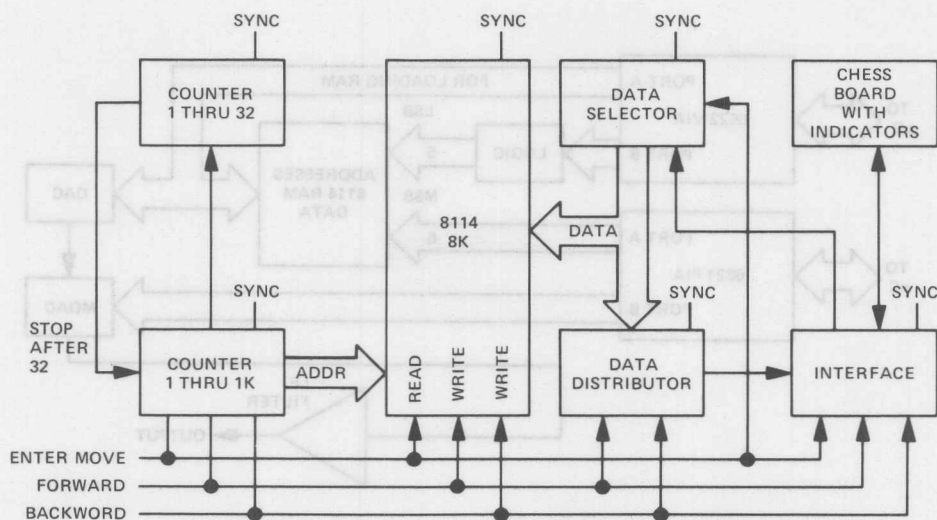





8K Static RAM Systems Applications

Chess Game (Move Memory)

A data selector reads chess board squares sequentially and stores the entire board in 32 bytes. Address for the 8114 is provided by a counter which increments 32 times when 'enter move' switch is pushed. In 'backward' and 'forward', the data distributor writes previous moves onto the board.



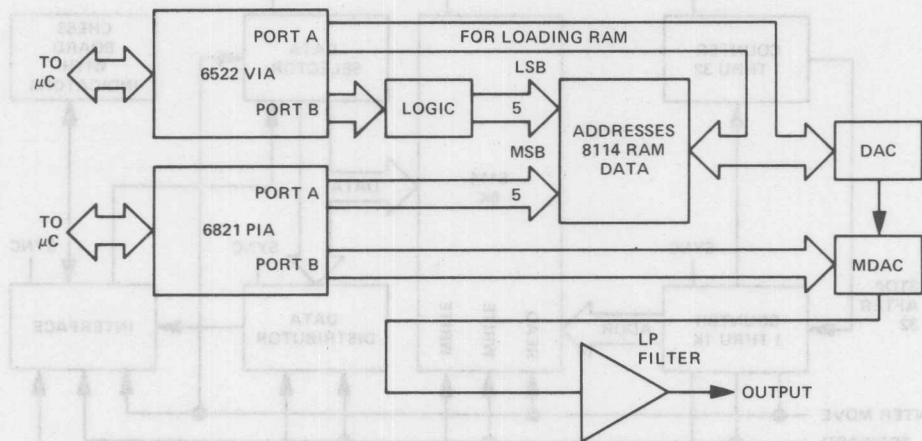


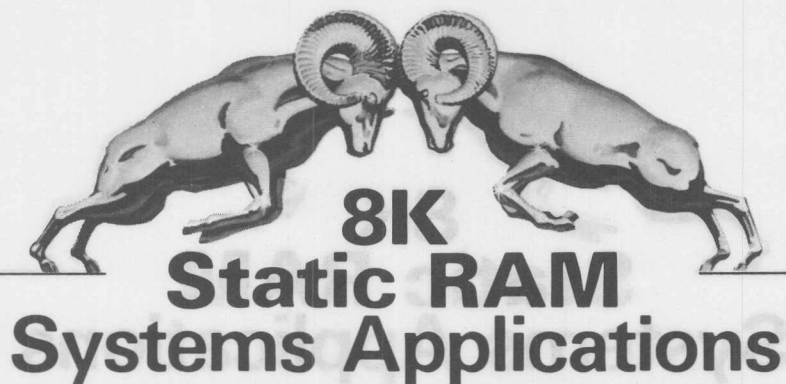
8K Static RAM Systems Applications

Music Synthesizer Board

In this application, an 8114 holds 32 each 32-byte waveforms. Logic takes the top octave note (generated by the timer in the VIA), selects the octave and produces five least significant address bits for RAM. When notes are played, RAM is stepped through each of 32 waveforms, via the five most significant address bits, thus varying the harmonic content of the tone as the note progresses. The multiplying DAC

controls the envelope of the waveform while frequency of the tone is controlled by varying the rate of new addresses to the RAM. Note: The engineer who submitted this application states the circuit has very low noise and can be constructed for as little as \$65.00. It was also stated that the circuit is useful as a complex waveform generator.



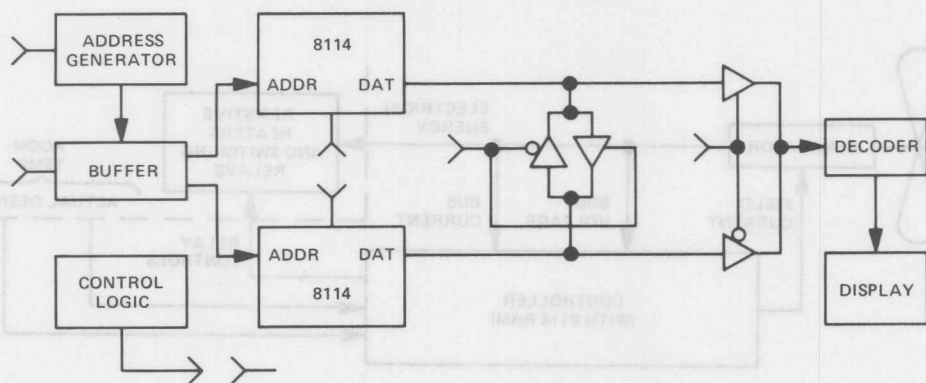



8K Static RAM Systems Applications

Card Shuffler

Card shuffling problems are encountered in a variety of mathematical entertainment problems and in problems demonstrating probability concepts. A number of possible electronic card games come to mind when one thinks of an electronic "card" shuffler (which would be the heart of any such game). A basic block diagram for the card shuffler is shown, where a deck of up to 1024 cards could be shuffled many different ways depending on the complexity of the control unit. During the shuffle, data passes between the two 8114's via the transceivers, and the addresses

of the shuffled data are skewed (by the buffer) by an amount determined by the control logic. The result of the latest shuffle is resident in the 8114 that receives the last shuffle. Upon the request of the user, the contents of this 8114 then pass through the enabled output buffer and through a decoder, and are displayed as cards. Note that since one standard deck contains 52 different cards, an 8-bit wide RAM (such as the 8114) is ideal for storing one card/memory word.



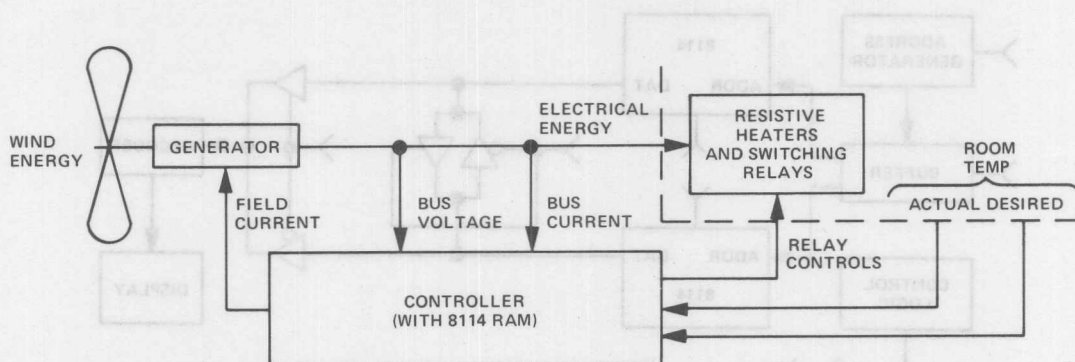



8K Static RAM Systems Applications

Household Heating System (Wind Powered)

This application will control a wind-powered household heating system with a microcomputer containing an 8114. The electrical energy available from a windmill driven generator rises rapidly as the wind velocity increases; so does the heat required to hold a house at a constant temperature. Optimum efficiency at a given wind speed requires knowing the generator

characteristics as well as being able to control the load on the generator and the field current. A microprocessor controller can perform these functions while also routing the current to resistive heaters in the rooms needing heating. No energy storage is required and the generator voltage need not be well regulated (just so it doesn't go too high).

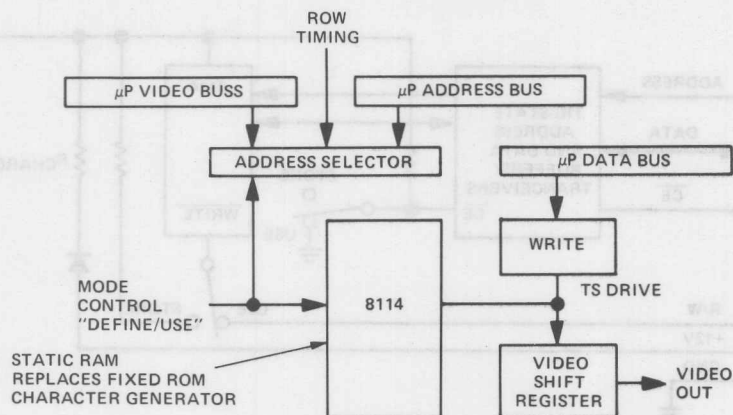





8K Static RAM Systems Applications

User Configurable Character Generator for Personal Computer

Existing locked-in ROM character generator is replaced by programmable 8114. Advantages are (1) Extreme speedup of animation and hires graphics (2) Wide choice of full case fonts including lower case descenders (3) Easy mix of alphanumeric characters and hires graphics (4) Adaptability to color video camera tilting and special effects generation (5) Allows special or non-standard codes on an as-needed basis.

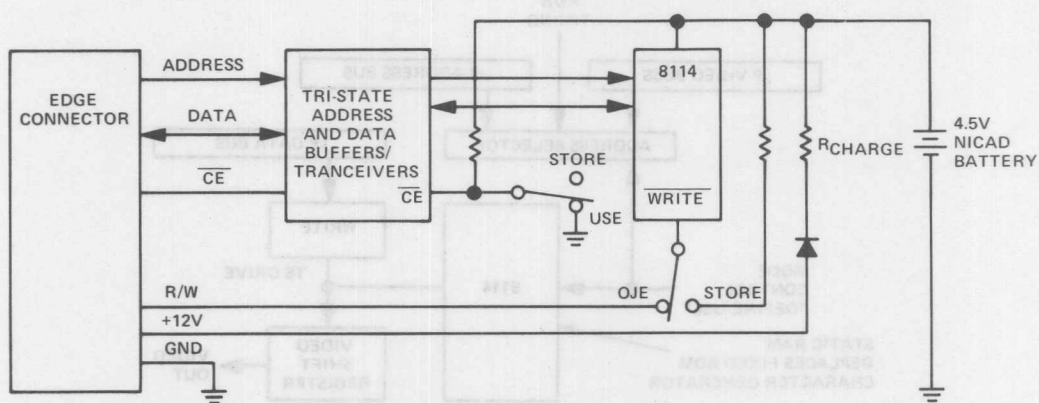





8K Static RAM Systems Applications

Data Logger

A battery backup data storage "cassette" for use in a microprocessor controlled data logger. Since the 8114 is 8 bits wide, RAM can easily be expanded by adding single RAM chips. Nickel-cadmium batteries are utilized to retain data. This device would be useful in applications where high shock and vibration levels would rule out the use of mechanical storage units.

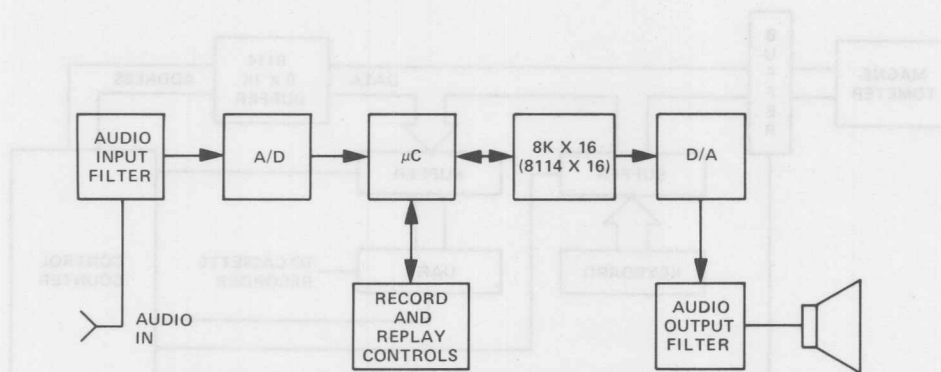





8K Static RAM Systems Applications

Digital Recorder

Using 16 each 8114's (128K bits) and sampling the audio signal at 12 KHz, 10.5 seconds of audio can be stored in digital form. A/D and D/A will do the encoding and decoding respectively. The microcomputer can do the serial to parallel and parallel to serial conversions, generate the required time delays in software and monitor the commands from the two control switches, record, and replay. The program can be implemented so at the end of 10.5 sec., after the record signal has been issued, and automatic playback can be initiated. The intelligibility can be improved by increasing the sample rate, although the storage time will be diminished.

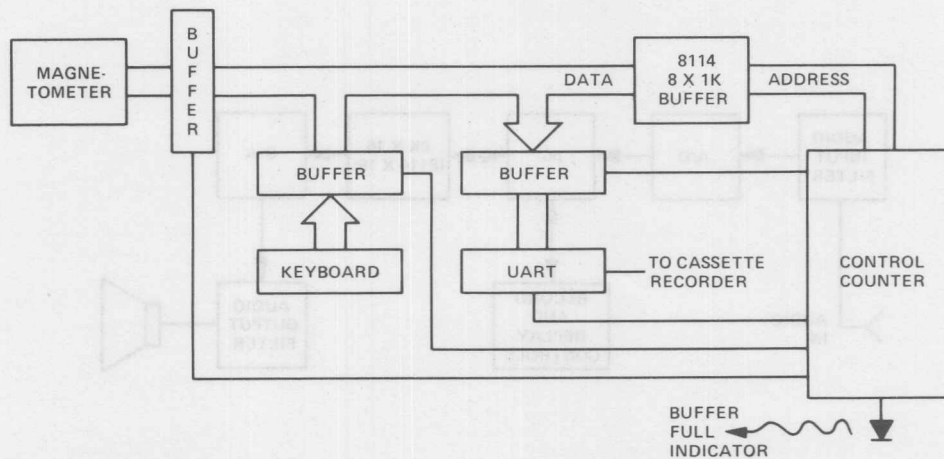





8K Static RAM Systems Applications

Geo-Magnetic Data Logger

The system accepts ASCII data digits from a commercial magnetometer and stores them along with an operator supplied set of field coordinates in a 1K X 8 bit buffer (the 8114 RAM). A control-counter circuit signals the operator when the buffer is full so that it may be dumped to cassette tape. This speeds up the data taking process by eliminating the need to write down each data point.

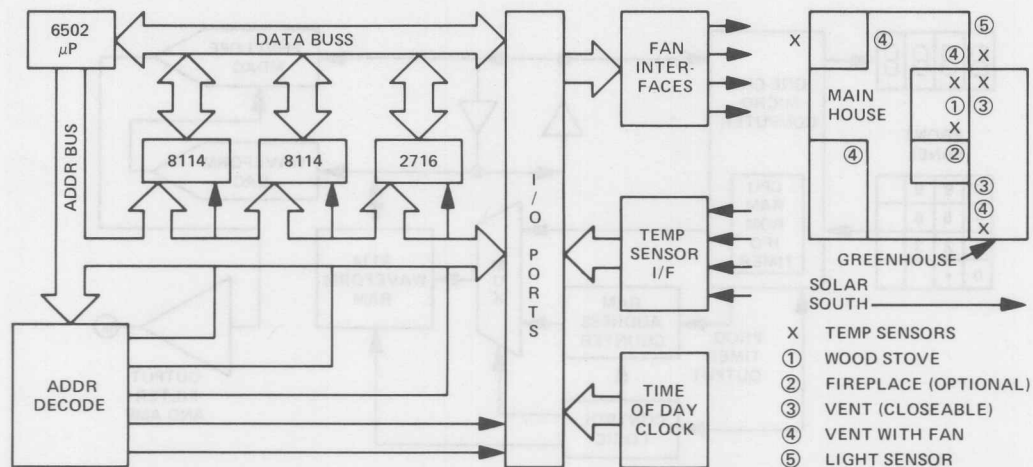





8K Static RAM Systems Applications

Solar/Wood Heat Control System

This system will monitor the temperature in an attached solar-heated greenhouse (which supplies the main house with heat), the main house, and the outside. The system controls the operation of the passive heat vents or fans for the distribution of heat. Optional features include a sunny day sensor. The system can predict energy needs and cause the temperature (in the house) to run high or low based on morning/afternoon, winter/summer, or cloudy/sunny. In addition, the system will request supplemental wood heat to minimize delta temperatures.



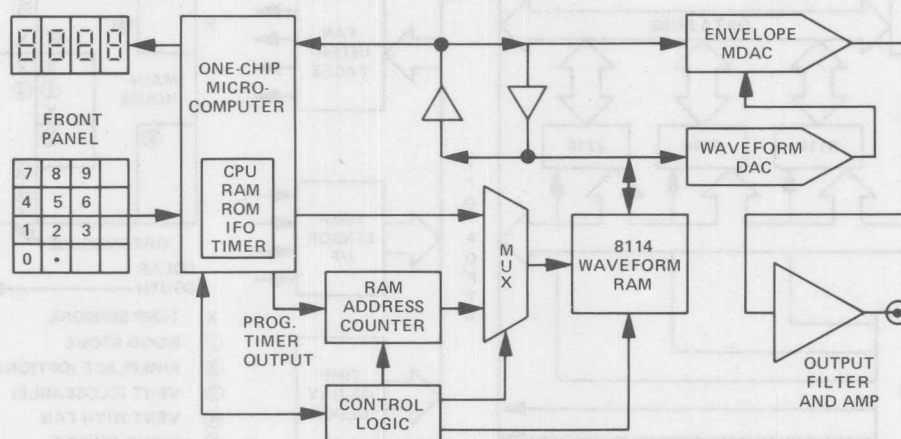



8K Static RAM Systems Applications

Programmable Function Generator

The design shown below can be used to produce any desired waveform. The 8114 is used to store either 1024 X 8 samples or 512 X 12 samples of the waveform, which is reconstructed at the desired rate by a byte-oriented digital-to-analog converter and filter. A multiplying DAC provides amplitude or envelope control of the output. A one-chip micro-computer is used to control the keyboard and display,

allowing for waveform and parameter entry. Synchronizing logic is used to allow the waveform RAM to be updated without any "glitches" in the output waveform. An IEEE-488 interface could easily be added to provide for automatic operation. The system could also be used as a versatile music synthesizer.



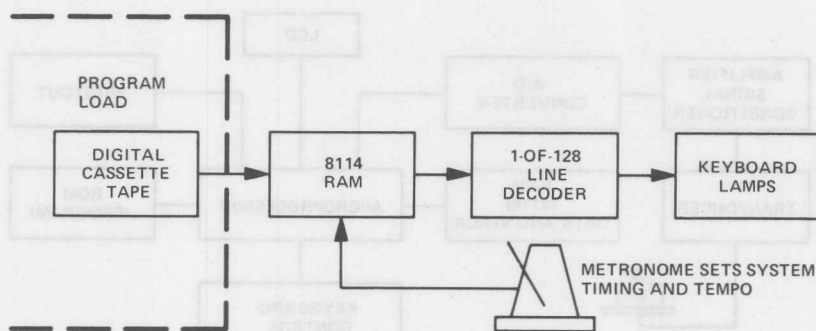



8K Static RAM Systems Applications

Piano Prompter

This application is an OEM option to be supplied by piano, organ, musical toy and other keyboard instrument manufacturers. The prompter is in the form of a metronome which drives small light bulbs imbedded in the instrument keys. Each key light is addressable by a 1-of-128 line decoder. Sequence data are stored in one or more 8114s. The data are loaded into RAM from cassette tape. The player sets the metronome,

which in turn sets the system clock, from presto (208 beats/minute) to largo (40 beats). Once initiated, key-light addresses are accessed, decoded, and used to drive 1-shots that in turn drive the lamps. The sequence of lights prompts the keyboard musician so he can learn a piece of music, as in the new μ P-ized home organs, conventional pianos and toys.

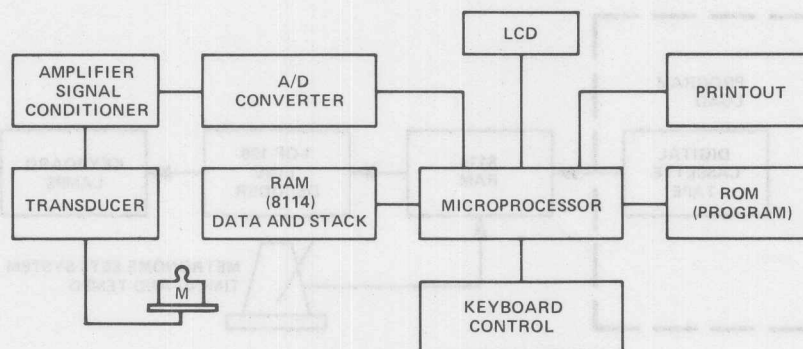





8K Static RAM Systems Applications

Electronic Weighing System

This system is capable of performing several functions using a microprocessor. Using a RAM there would be an improvement over analog systems in subtracting large tare weights which would be stored in the data memory (RAM). The 8114 would be used for the system stack as well as temporary data storage. A liquid crystal display would make the scale readable under high ambient light conditions. The system could also be used for counting and pricing of large quantities of identical items.






8K Static RAM Systems Applications

Line Transient Digitizer

This system would be used when intermittent faults in electronic equipment are suspected of being line transient related. This microprocessor controlled device would monitor equipment under test waiting for an operating fault. Though an AC line voltage sensing A/D input, the system continuously circulates the line voltage data through it's RAM's. When an operating fault in the equipment under test occurs, the microprocessor "powers up" a strip chart recorder and calculates the address location of line voltage recorded one second ago, and stores it as "starting address." The 8114 is then loaded with line

voltage data, five seconds worth, up to the starting address. Data is then outputted to the chart recorder which, by now, has had time to stabilize. New data is recorded by the RAM as six second old data is read out to the strip chart recorder, one byte at a time. Data is recorded for some preset time, after which the strip chart recorder is shut down, the equipment under test is reset, and the process reset. If six seconds of data is sufficient, the system can hold data without the recorder. With 16 samples per 60 Hz waveform, one 8114 holds about one second of data. This system could be battery powered.

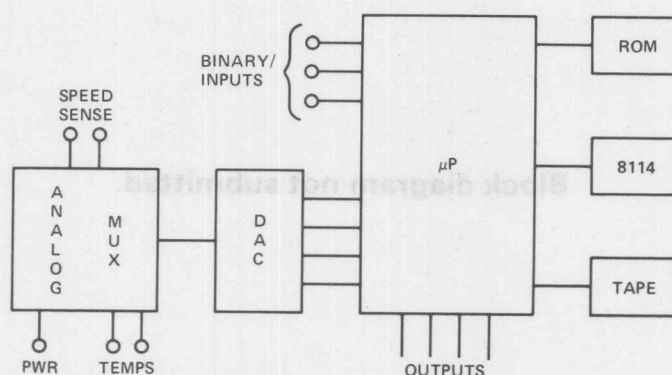
Block diagram not submitted.




8K Static RAM Systems Applications

Wind Powered Induction Generator Controller

This unit will check windspeed, generator speed, power output, temps, etc., and correct for out-of-limit conditions. The unit will also compile a history of operational parameters in the RAM for documentation and service purposes. The 8114 provides a buffer function for magnetic or paper tape data storage and records. Low power standby will prevent data loss during power failure.

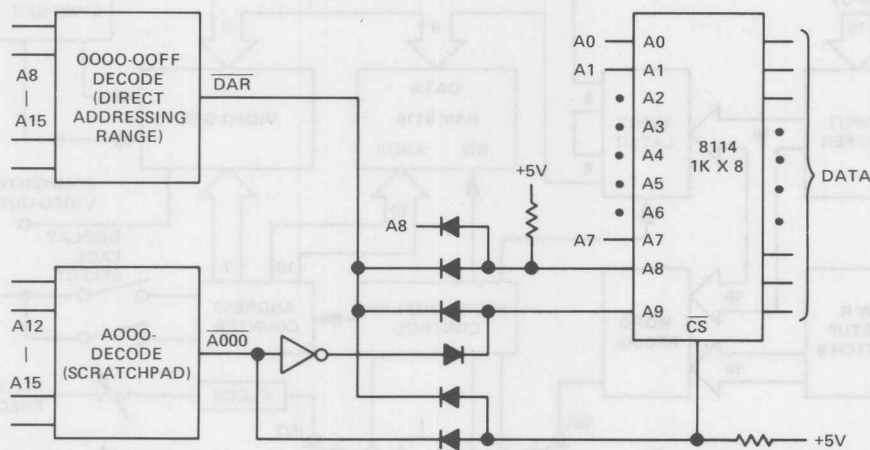





8K Static RAM Systems Applications

Scratch Pad

This application is to replace direct addressing RAM and monitor the scratch pad RAM with a single 8114. 6800-based systems using MIKBUG, et al, monitor ROMs require scratch pad RAM from A000-A07F hex. Also, programs stored in ROM usually require RAM in the direct addressing range from 0000-00FF hex. Usually this requires 3 X 6810 RAMs (128 X 8). Decoding addresses as shown below allows using a single 8114 with the added advantage of RAM from A080-A0FF as required by some applications. One-quarter K appears from 0000-00FF. One-half K appears from A000-A0FF. One quarter K is unused.

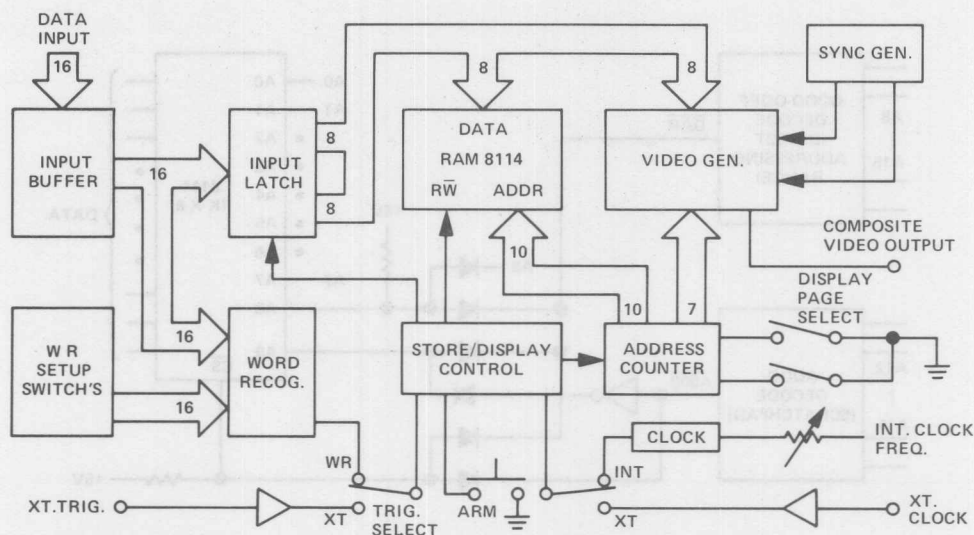





8K Static RAM Systems Applications

Logic Analyzer

This application is for a simple yet fully functional logic analyzer to connect to a standard raster scanned video monitor or television. The system offers 16 data inputs by 512 words storage. The sample clock may be either external or internal with variable rates. The system may be triggered from either an external source or from the internal word reorganizer. The display will show a 16-trace timing diagram in four pages of 128 words per page; the traces are easily read as fully connected lines. A moveable timing reference cursor may be positioned anywhere across the screen.

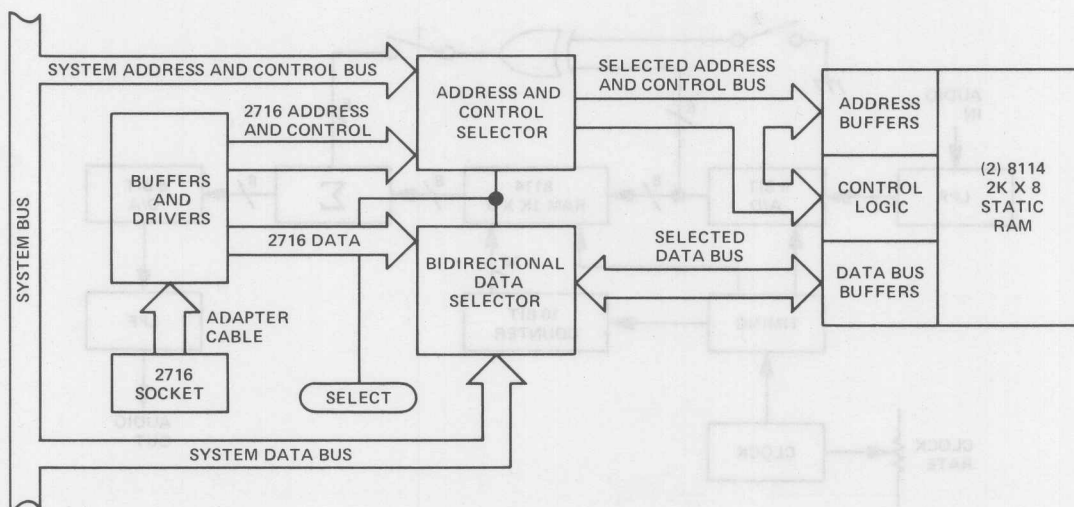





8K Static RAM Systems Applications

2716 EPROM Emulator

Using two 8114's and some buffering and control logic it is possible to emulate (simulate) a 2K X 8 EPROM. The "PROM" is loaded from the system data path when the select signal is in the system mode. When the select signal is in the PROM mode, the data is read from the static 8114, just as it would be from a PROM. This circuit allows "firmware" to be tested and changed without having to program an EPROM.

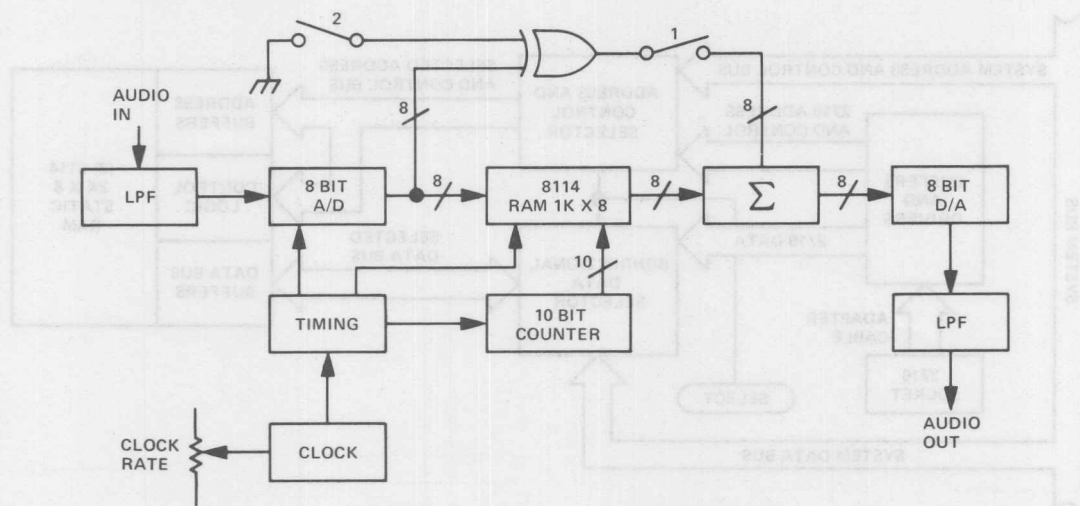





8K Static RAM Systems Applications

Music Delay Line

This application uses the 8114 as a 1024 X 8 shift register as an analog delay line. When switch 1 is open the circuit acts as an analog delay line; with switch 1 closed and switch 2 closed the circuit acts as a correlator for signals that repeat every 1024 clock pulses. Opening switch 2 and closing switch 1 will cause the circuit to operate as a notch filter when the signals repeat every 1024 clock pulses. This system makes this circuit useful for sound generation reverb, flanging and delays.



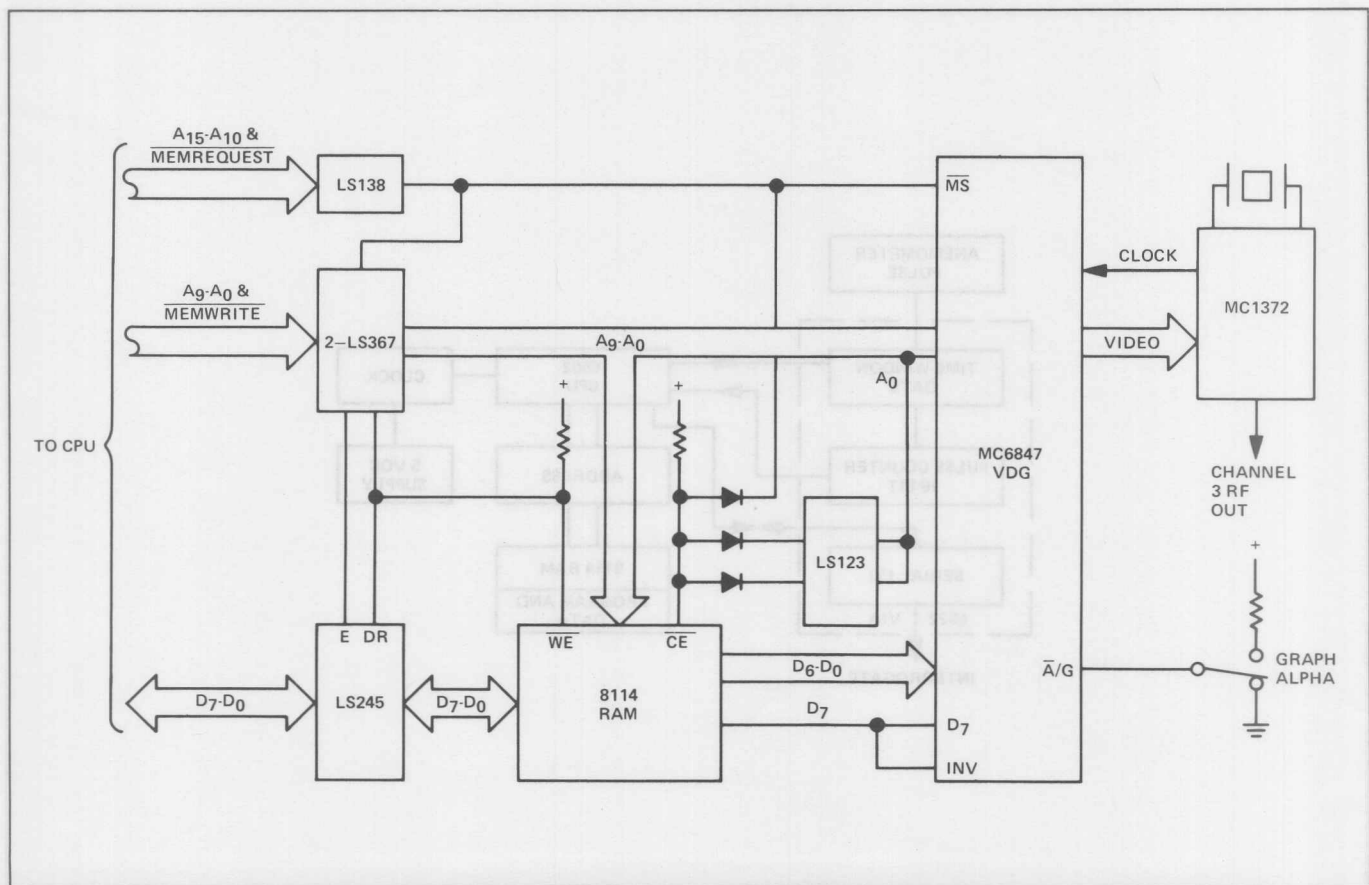


8K Static RAM Systems Applications

Graphics Display

This application is for a complete video display with switchable alphanumerics and graphics modes using 8 IC's. Based on the MC 6847 video display generator, the alpha mode has 16 lines of 32 characters; the graphics mode has a 128 X 64 grid. Memory-mapped addressing is decoded by a 74LS138 creating enable for buffers and RAM while disabling the VDG busses. The VDG sequentially addresses RAM for screen refresh; and, using the A_0 line and a 74LS123, \overline{CE} is


generated for the 8114 "read" function. In the alpha mode, D_7 generates a simple cursor and coarse graphics. Clocking for the VDG comes from the MC 1372 which also interfaces the circuit with a standard TV set. Screen control (cursor, scrolling, etc.) is software driven. This design is a "stripped-down" version. Adding RAM and additional decoding, higher resolution and up to 8 colors are possible.





This application is a low cost wind speed spectrum monitor for evaluating the long-term wind speed spectrum at candidate windmill construction sites. A tower mounted anemometer sends pulses (whose frequency is proportional to wind speed) to a time-window gated accumulator counter. At the end of the count period the highest bit set in the counter represents the range of the average speed during that count, and determines which of several multi-precision RAM counters in the 8114 is incremented to accumulate the spectrum data.



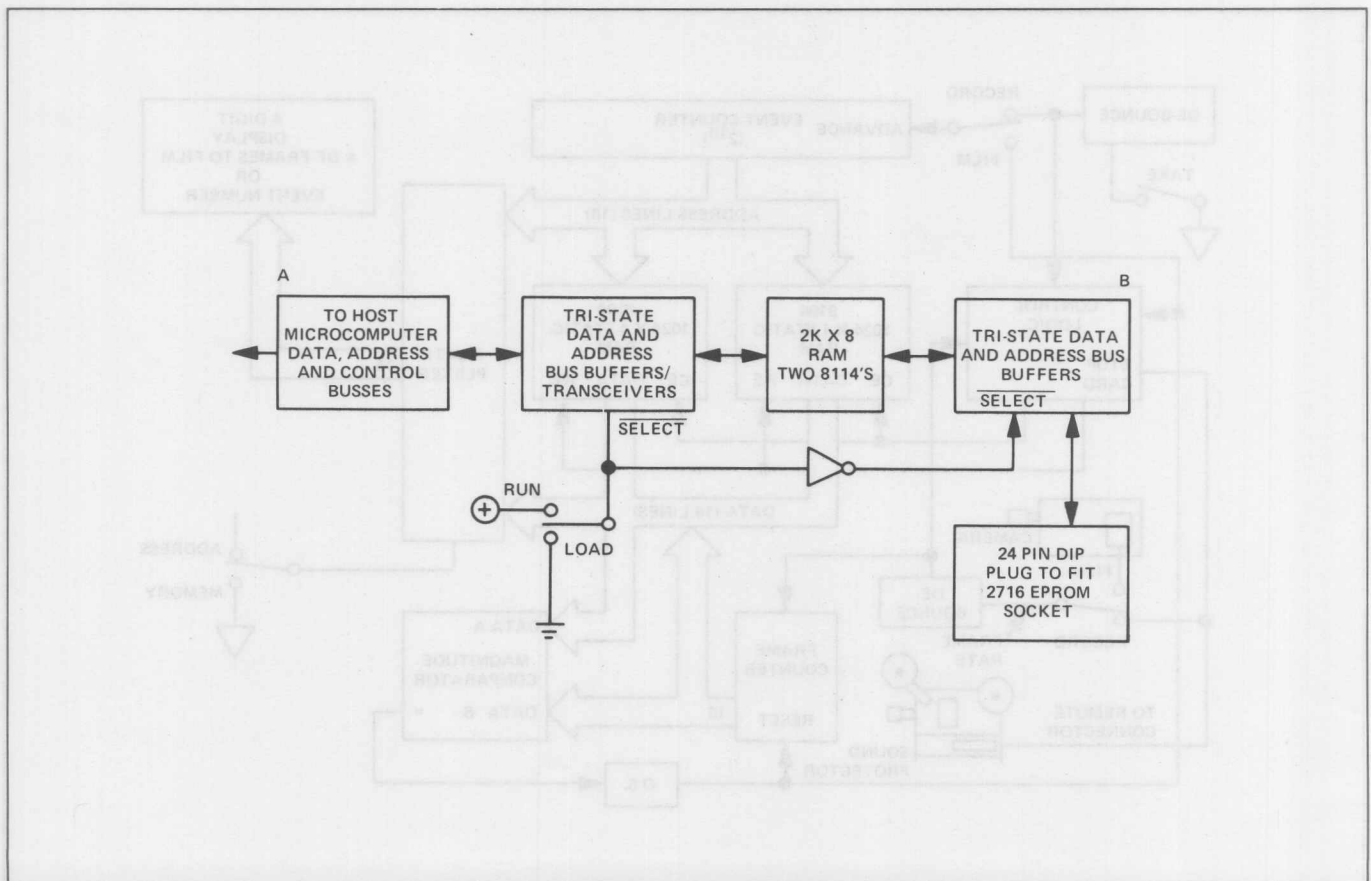



8K Static RAM Systems Applications

2716 EPROM Simulator

The block diagram shows the basic system, which is a dual port RAM. On side A, the RAM is interfaced into a microcomputer system such as the AIM 65, Apple, or a development system. The monitor in such a system provides the capability to quickly enter, alter, or read data in the 2K X 8 RAM when the switch shown below is in the "load" position. On side B, the

2K X 8 RAM is interfaced into the system under development via the 24 pin DIP plug which replaces the 2716 EPROM. With the switch shown below in the "run" position, the 2K X 8 RAM appears to be the 2716 EPROM. The system allows someone to easily change software without erasing/re-programming EPROMS.



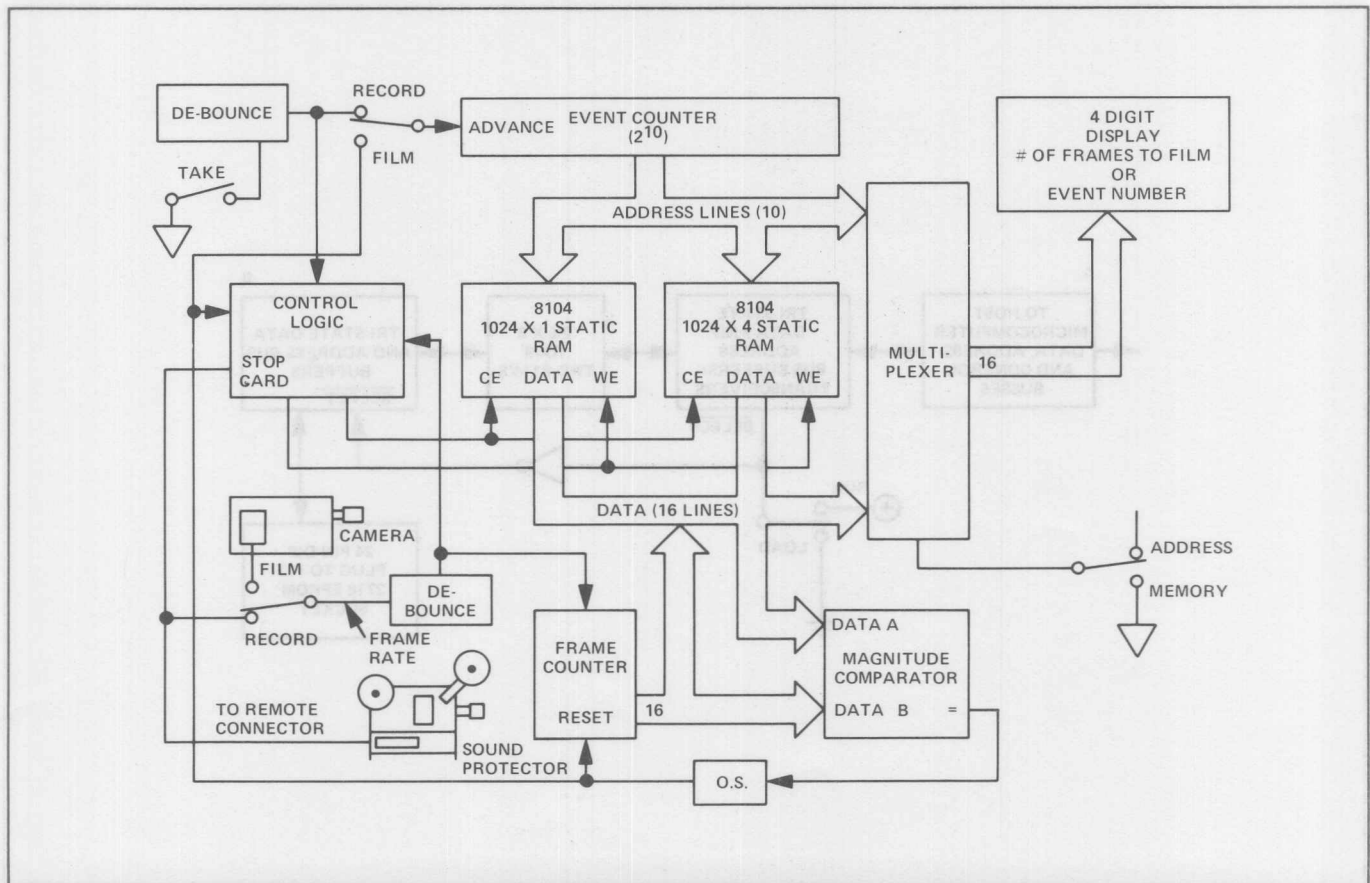


8K Static RAM Systems Applications

Music Synchronizer (For Motion Picture Production)

Adding memory capability to a motion picture camera can add a new dimension to home movies. The result will be a movie that changes each scene to the rhythm or beat of any piece of recorded music. The memory (two 8114's) reduces an editing task to a simple push of a button, eliminating hours of cutting and splicing film. Using two 8114's will give 1024 events or scene numbers and will allow up to 9999 frames per scene. The memory stores the number of (projector) frames

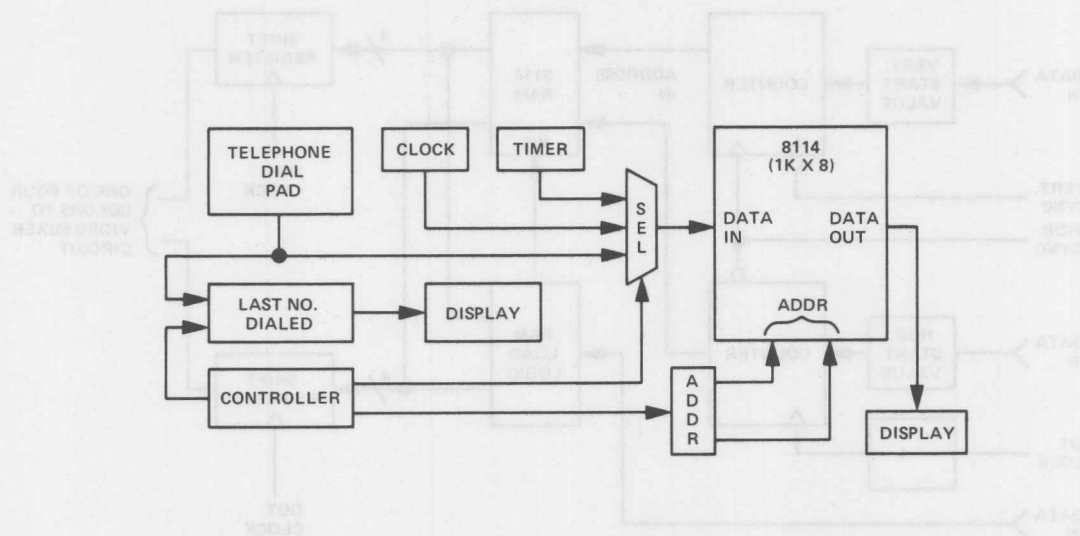
between each beat of music through action of the take switch. After programming the memory, a movie camera (with flash sync) is plugged in, the camera man starts the camera and the control logic stops it through the remote plug. After a roll of film is exposed, it is processed and a sound stripe added. Then a film lab can transfer the original music (on a blank roll) to the processed roll giving a complete synchronized production.




8K Static RAM Systems Applications

Weekly Telephone Call Recorder

This recorder will store specific data for all outgoing phone calls including date, time of day, elapsed time of call, and phone number. The last number dialed will be displayed so that it can readily be available in case of a busy signal or no answer. Data is stored as 2 BCD digits per memory location.

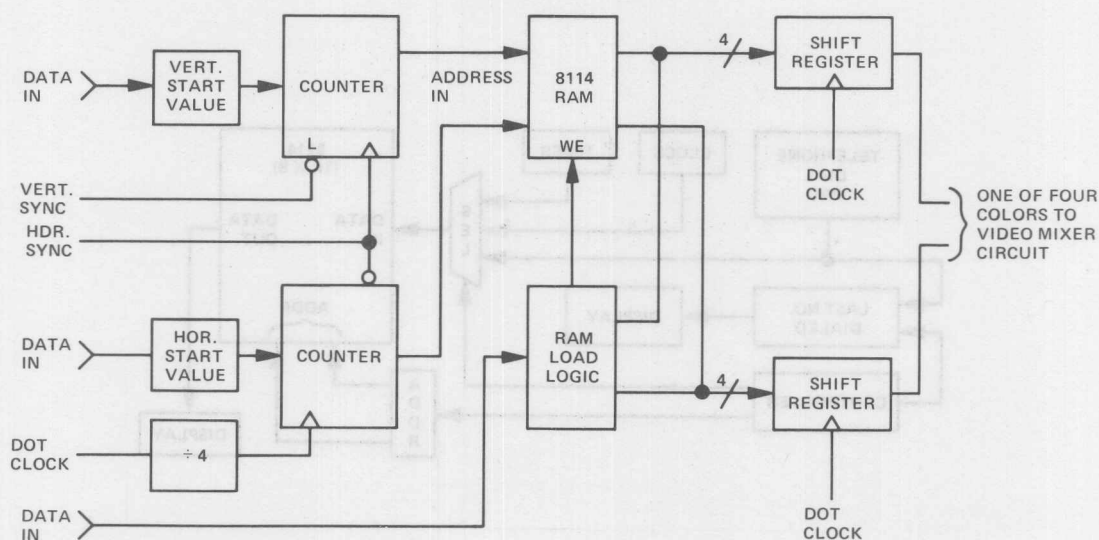





8K Static RAM Systems Applications

Graphic Display

This application for an 8114 is to contain the image of a moving object for a bit map color raster graphic display system. Each 8114 RAM can hold a 64 X 64 pixel object with each pixel being one of four colors. The address of the 8114 RAM is driven by counters that are synchronized with the horizontal, vertical and dot clocks. By loading the counters with the proper starting value, the object can be moved around the display. One circuit is needed for each object displayed.





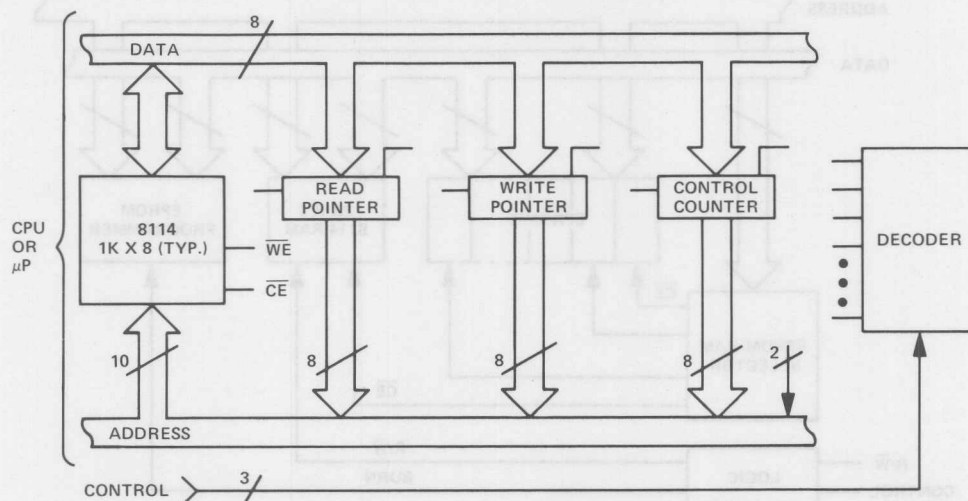
8K Static RAM Systems Applications


FIFO Memory

Data from one or more analog sensors are collected and stored in a FIFO memory. By polynomial conversion, the data is scaled ($Y = A_0 + A_1 + X + A_2 + X + \dots$) and the conversion is performed in a LIFO memory. The coefficients are stored in a general purpose register 32 bytes deep to allow for a maximum of 15 double precision coefficients. After conversion, the values are stored in RAM. The conversion program is located in the unused G.P. registers. The FIFO, LIFO, RAM and 32 deep G.P. registers can be built into one 8114, with the addition of three counters (3 state outputs) and a 3 to 8 decoder as shown in the block diagram. The speed of conversion is limited only by

the 8114 RAM. The read and write pointers are used to manage the FIFO, the control counter used for the LIFO in the counting mode and as an absolute address register in the preset mode.

MEMORY ASSIGNMENTS		
00XXXXXXXX	8 GP REGISTERS 32 BYTE DEEP	0-255
01XXXXXXXX	256 BYTE FIFO	256-511
10XXXXXXXX	256 BYTE LIFO	512-767
11XXXXXXXX	256 BYTE RAM	768-1023





8K Static RAM Systems Applications

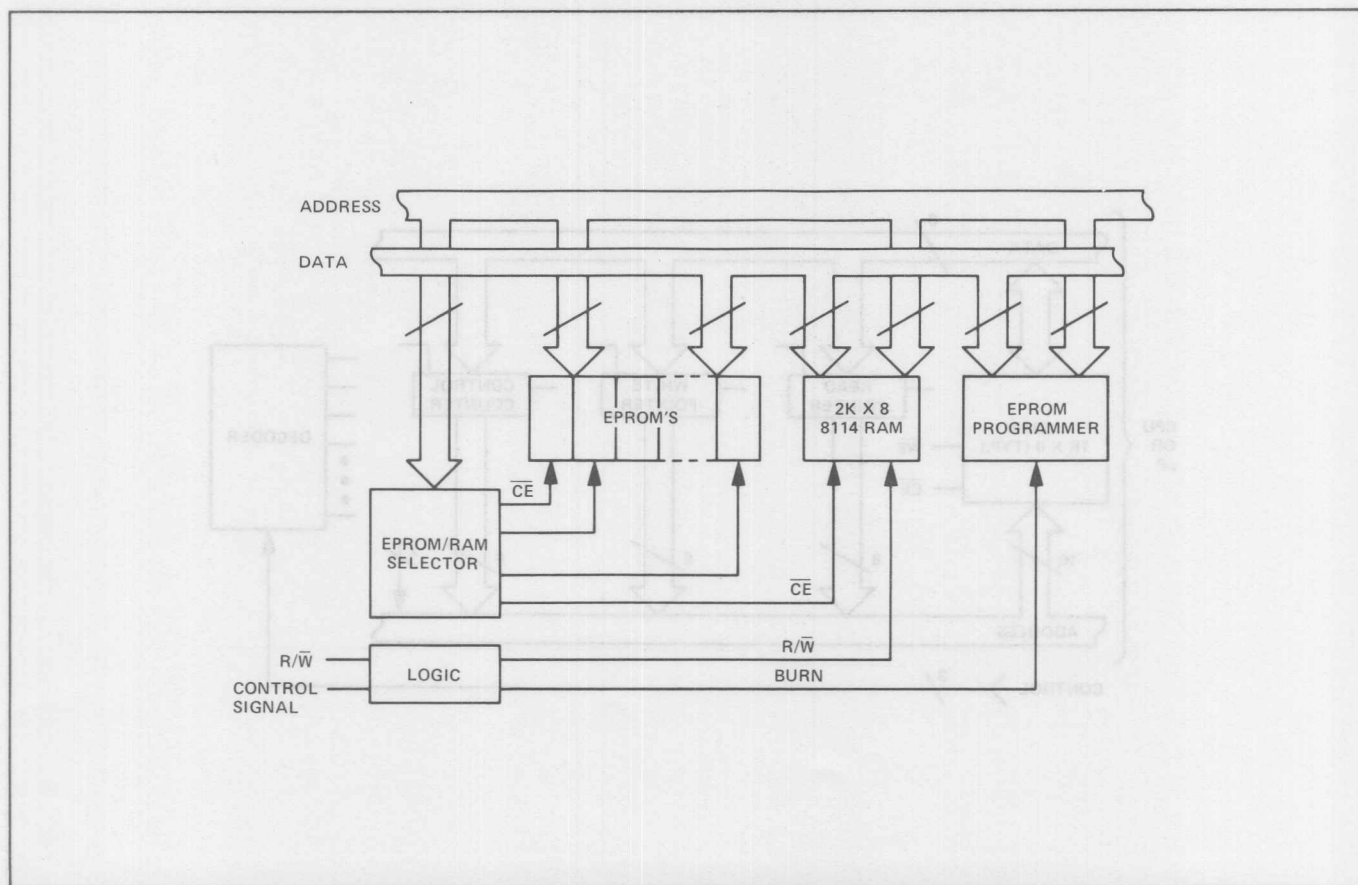
2708/2758 EPROM Programming


EPROM's are commonly used to store the basic utility programs in small microcomputer systems. During development of this software, it is a common practice to program and erase several EPROM's. The 8114 RAM which is pin compatible with the 2708/2758 EPROM's can improve the process by using the 8114 in two modes of operations: 1) RAM—during which

the program is stored and modified 2) ROM—during which the program is being tested. After a few iterations once the testing is completed, the content of the RAM is copied to the on board ROM/EPROM. The advantages using the 8114 RAM are: small area, low power and time and ease in modifications of the data stored.

0000	00000000	00000000	00000000
0001	00000001	00000001	00000001
0010	00000010	00000010	00000010
0011	00000011	00000011	00000011
0100	00000100	00000100	00000100
0101	00000101	00000101	00000101
0110	00000110	00000110	00000110
0111	00000111	00000111	00000111
1000	00001000	00001000	00001000
1001	00001001	00001001	00001001
1010	00001010	00001010	00001010
1011	00001011	00001011	00001011
1100	00001100	00001100	00001100
1101	00001101	00001101	00001101
1110	00001110	00001110	00001110
1111	00001111	00001111	00001111

double precision coefficient. A double precision coefficient is stored in RAM. The conversion program is located in the unused G₉ register. The HFD LFD, RAM and 32 deep G₉ registers can be built into one 8114 with the addition of three counters (3 state output) and a 3 to 8 decoder as shown in the block diagram. The speed of conversion is limited only by

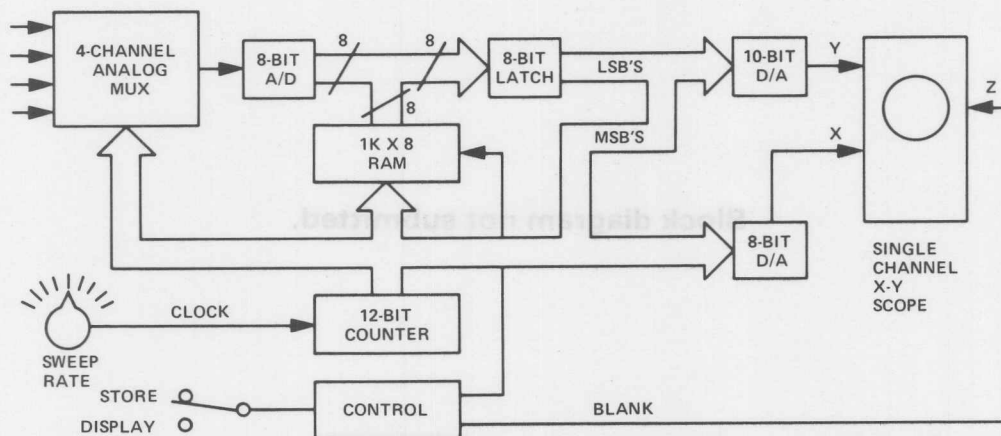





8K Static RAM Systems Applications

Storage Oscilloscope

This 4-channel storage oscilloscope sequentially samples 4 analog signals until "display" is selected. When "display" is selected, sequentially read-out contents of RAM, convert to analog with counter information defining channel number forming message display on X-Y scope.






8K Static RAM Systems Applications

Instrumentation

A common quality assurance test for copper wire is to measure the surface oxides. This procedure is accomplished by impressing a known DC current through the wire sample being tested. The resultant voltage is monitored through an A/D converter and when a specific charge is detected, the amount of surface oxides can be computed. In this application, the 8114 is used in conjunction with a microprocessor

to store and compare the rate of change of the voltage. RAM is considered necessary because different sample sizes constitute different rates of change. The microprocessor can re-compute and store necessary data for different sample sizes, whereas ROM would require excessive amounts of storage space.

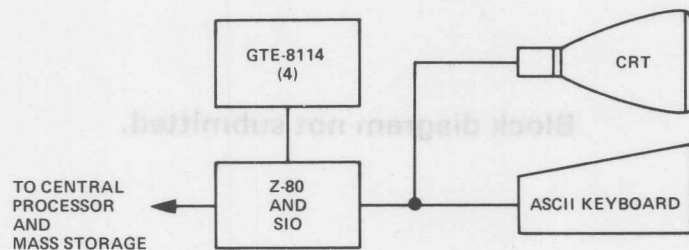
Block diagram not submitted.




8K Static RAM Systems Applications

Word Processing Terminal

This application for an 8114 is to use as a character memory in inexpensive terminal for a word processing systems. At 3200 characters per page, only 4 8114 static RAMs are required. If an ASCII keyboard with parity is used, no special software is required to utilize all bits in the 8 bit ASCII character memory. A Z-80 CPU and an appropriate serial I/O allows a good character string-handling ability and communication with a central data storage unit. At 9600 baud, 3.41 seconds are required to transfer a single page to and from a central storage location. This compares well with floppy disk storage time. An 8275 (Intel) CRT controller would reduce the chip count.



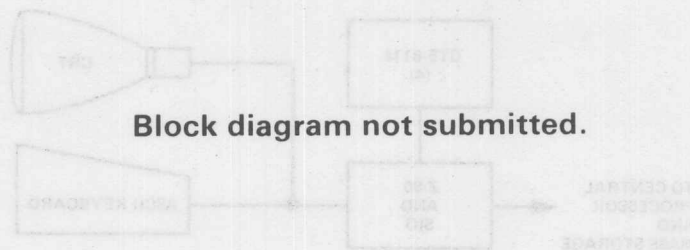



8K Static RAM Systems Applications

Chess Recorder/Annunciator

This application provides a combination digital chess game clock and move recorder that allows moves made during a tournament to be recorded in the 8114 RAM. The record of moves would be available during the course of the game via a dedicated LCD or LED display. The moves record could be made permanent by a print out at the completion of the game.

A 2-80 good character string-handling ability and communication with a central data storage unit. At 8000 baud, 3.47 seconds are required to transfer a single page to and from a central storage location. This compares well with floppy disk storage time. An 8278 (Intel) CRT controller would reduce the chip count.

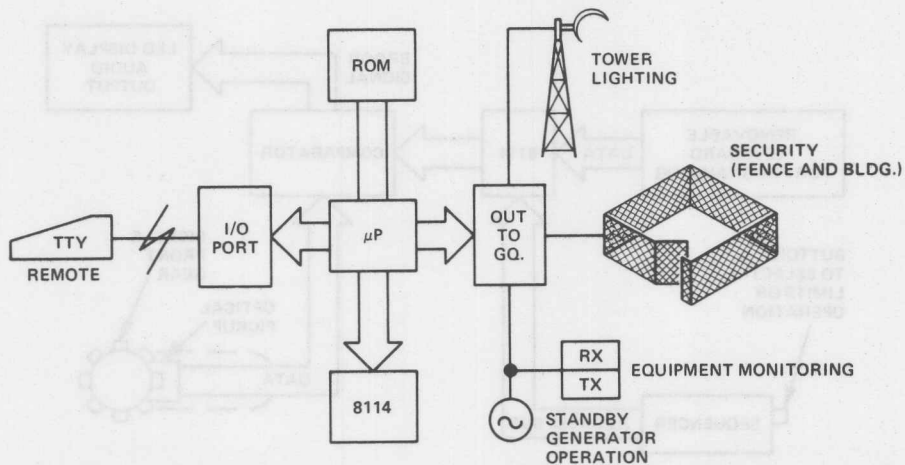





8K Static RAM Systems Applications

Security Monitor

Integrated with RCA 1802, the 8114 provides RAM for microwave sites with tower lighting monitoring, equipment and security monitoring.

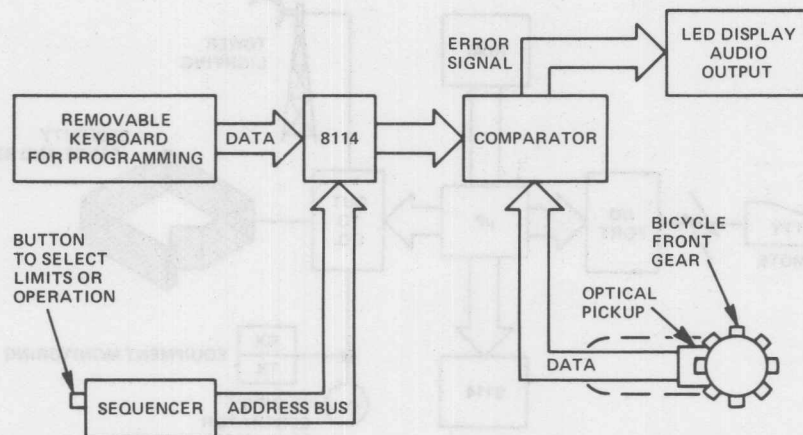





8K Static RAM Systems Applications

Bicycle Cadence Control

This application is intended to help train a bicycle rider to use the proper pedaling cadence; the device could also function as a speedometer.

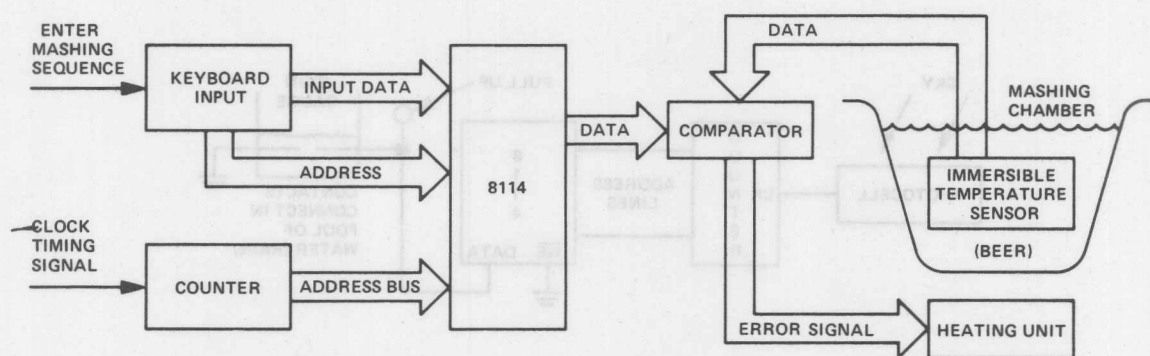





8K Static RAM Systems Applications

Home Brew Monitor/Controller

This application provides a controller to "conduct" the mashing process when brewing beer. Mashing typically requires several hours with a precise temperature regulation at all stages. The 8114 RAM provides an acceptable storage unit for the control sequence.

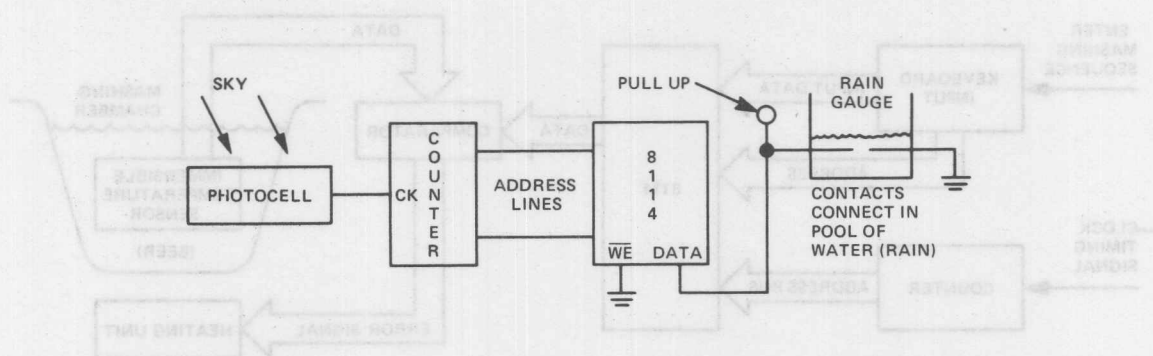




8K Static RAM Systems Applications

Rain Gauge/Recorder

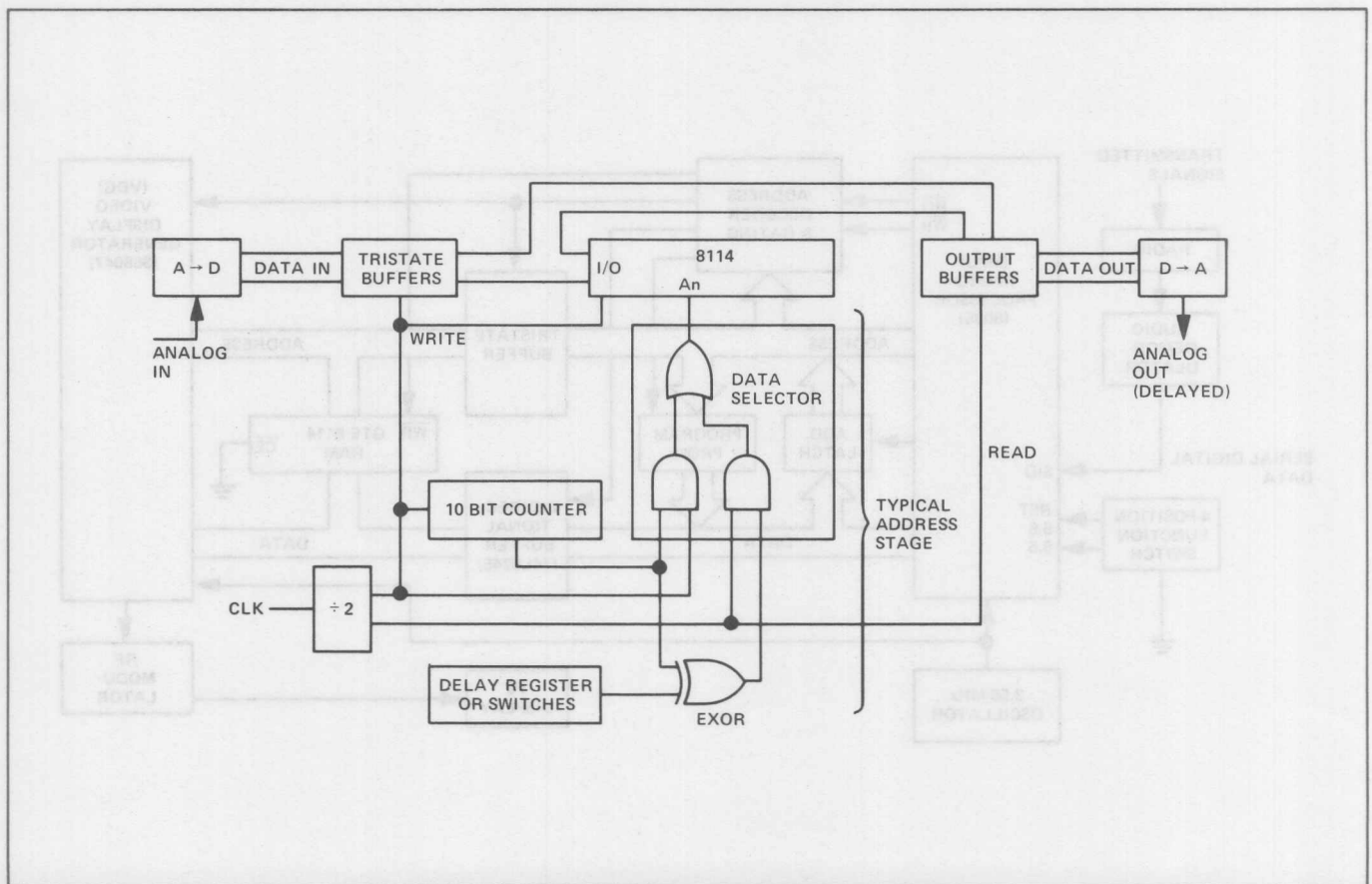
This application is for an 8-kiloday rain recorder. A photocell pointed at the sky senses day and night and clocks the counter to the next address once a day. If there is rain in the gauge, the data input is low and a "0" is written. No rain will mean a "1" is written. This device need only be dumped once every 22½ years.




8K Static RAM Systems Applications

A to D Converter

Data in is sampled at the clock/2 rate. Data out is delayed by "N" counts depending on the setting of the delay register. If only the MSB of the address is inverted for the read cycle the data written in 512 clock pulses earlier would be read out. Applications include a digital phase shifter if an A→D is put on input and D→A on output, or for audio, a digitally controlled reverberation, and if some of the output is fed back to input—an echo chamber.

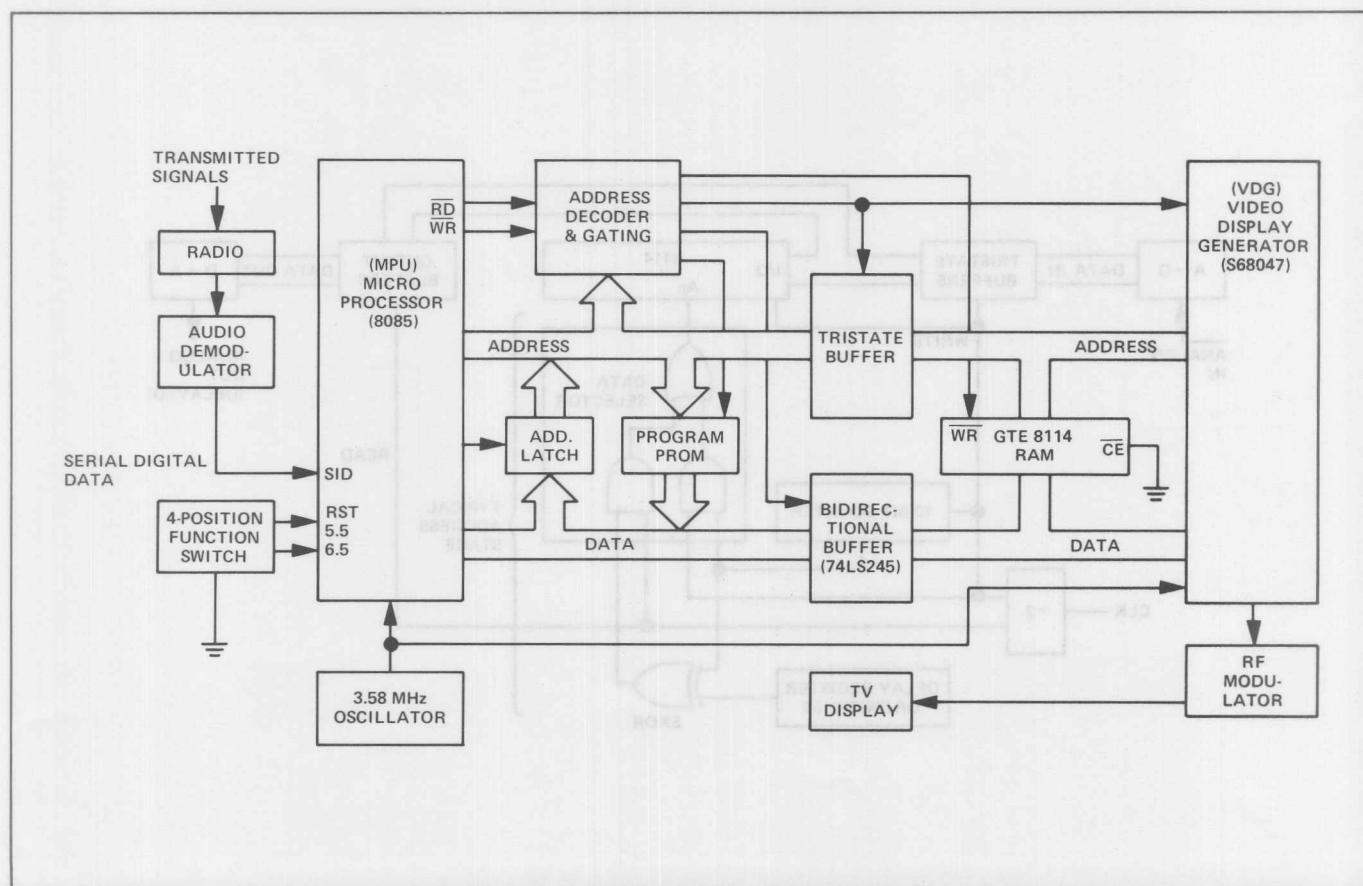





8K Static RAM Systems Applications

Video Display

This application uses an 8114 as memory map for 16 lines X 32 characters of alphanumerics, microprocessor stack, and program memory. The circuit containing the 8114 interfaces radioteletype signals to a TV display as shown in the block diagram. The RAM can be read by the VDG or the MPU, with the MPU having priority. Only the MPU can write to the 8114. The 8114 is always enabled, and written into a rising edge of WR signal. The bidirectional buffer is tristated when the VDG is reading the 8114, isolating the 8114 data from the MPU data bus.

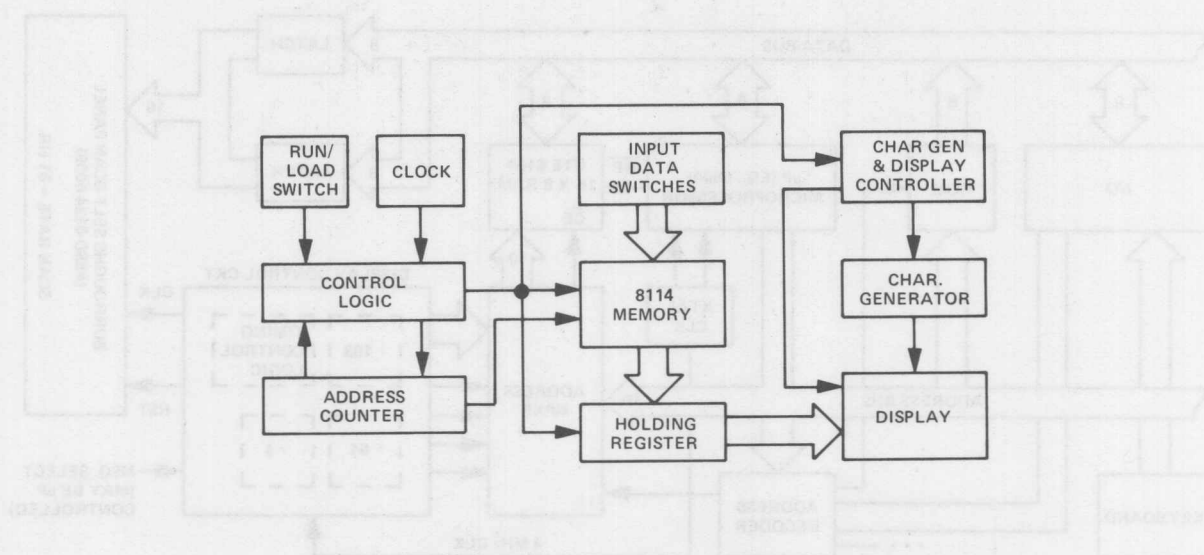





8K Static RAM Systems Applications

Programmable Display System

This application is for a self-contained, front-panel programmable, display system using alphanumeric displays. Using six-bit (2 bits are unused in memory) ASCII code and 16 characters, the system can display up to 64 lines. The lines are flashed sequentially at about a two-second interval. The system then repeats the sequence. If there are less than 64 lines to be displayed, a decoder/comparator will short-cycle the address counter. The system is programmed sequentially or selectively if address switches (not shown) are added.



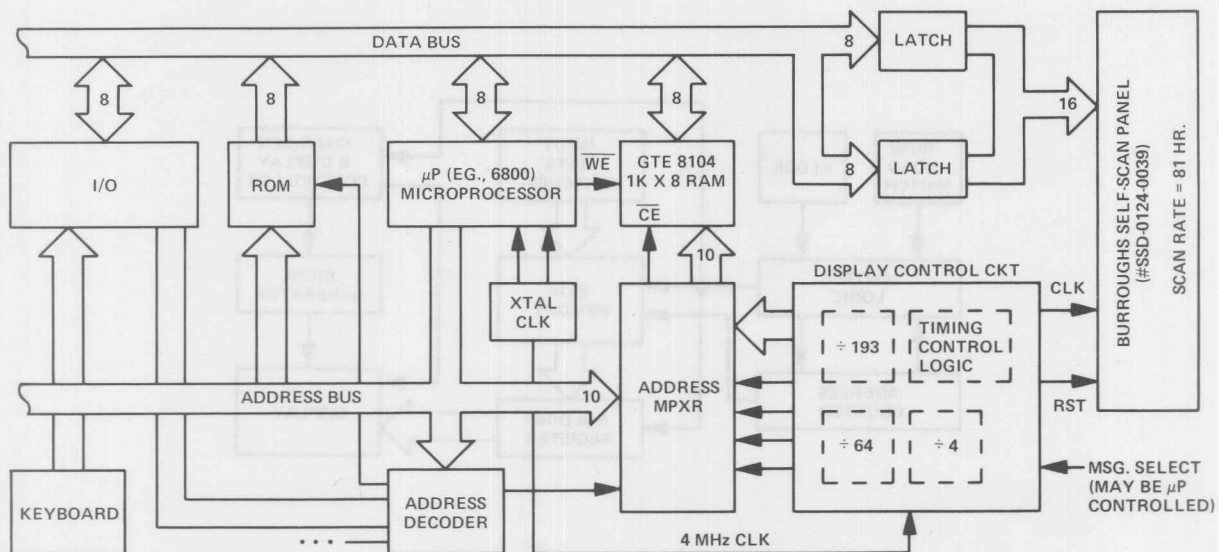



8K Static RAM Systems Applications

Display Memory

The Burroughs Self-Scan® panel and driver assembly consists of a matrix of 17 X 192 cells and requires data serially at its 17 data inputs. Using only 16 inputs still allows flexibility (3 rows of 5 X 5 characters, 2 rows of 5 X 7 characters, or mixed formats). The four quadrants of the RAM are used in pairs (upper and lower halves) for two independent messages or formats (e.g., inverse video) and are

addressed by either the μ P or a $\div 193$ counter in the display control circuit. (See block diagram.) The fast access time allows latching display data twice from the RAM during the first half of the μ P cycle, making it transparent to the μ P. The μ P can use the remaining 64 words of each quadrant as desired, while a software routine can load the display RAM with appropriate data.






8K Static RAM Systems Applications

Floppy Disk Controller

This application is for a pipelined floppy disk controller for the S-100 Bus. This combination of the 8114 1K X 8 static RAM and control circuitry allows the mapping of two 1K, 2K, 4K, or 8K blocks of disk buffer memory into the address space of the CPU under software control. Both blocks are assigned the same base address, with one being assigned "CPU status" and being addressed as data/program memory by the CPU and the other being assigned "buffer status"

and being treated as buffer memory by the floppy disk controller. This allows CPU access to current data while the floppy disk controller writes previous data or reads the next data block. When both operations are complete, the CPU/buffer status of each memory block is reversed and processing may continue immediately with no lost time due to disk access time or DMA operations.

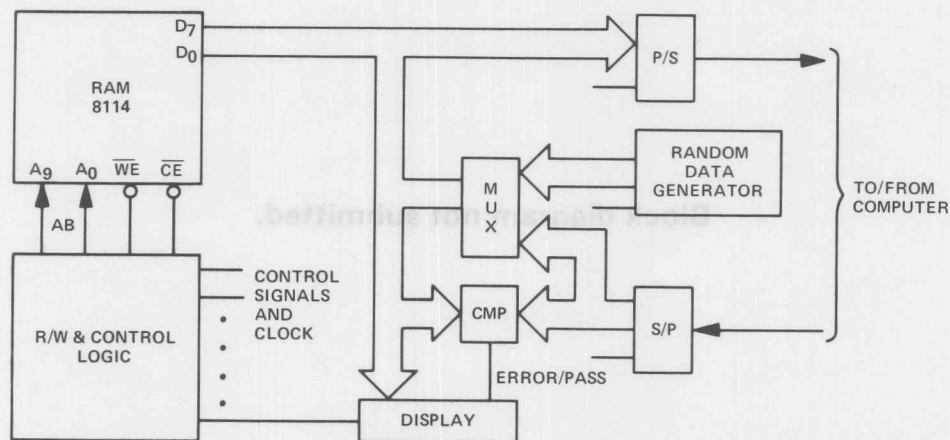
Block diagram not submitted.




8K Static RAM Systems Applications

Computer Communication Line Adaptor Simulator

Occasionally, the communication channel of a computer needs to be tested without proper peripheral. This "black" box simulates the line adapter for these purposes; it can be operated in four different modes such as receive data and display, receive data and transmit back (turn around mode), transmit data and receive same data back and then compare, and transmit random data. If the channel has a parallel interface P/S and S/P may be omitted.

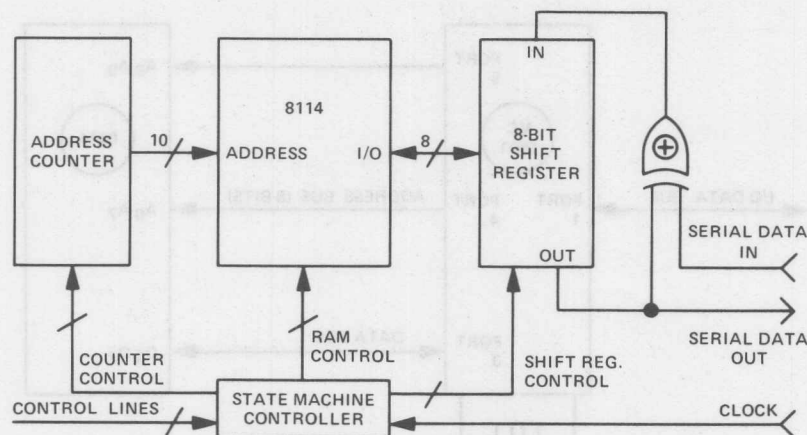





8K Static RAM Systems Applications

Interface

This application for an 8114 is in a circuit to generate redundant data sectors and to use those sectors to correct "bad" sectors in magnetic memories. As data is written to disk or tape, the bit-by-bit "sum" of a number of 1K-byte (or less) data records in a data "block" is accumulated in the 8114, and then transferred as the last record of that data block. Upon readback, if any one record is in error, it can be reconstructed by "summing" the good records in the block with the redundant record. The missing data from the record will then be in the 8114 and can be transferred out.

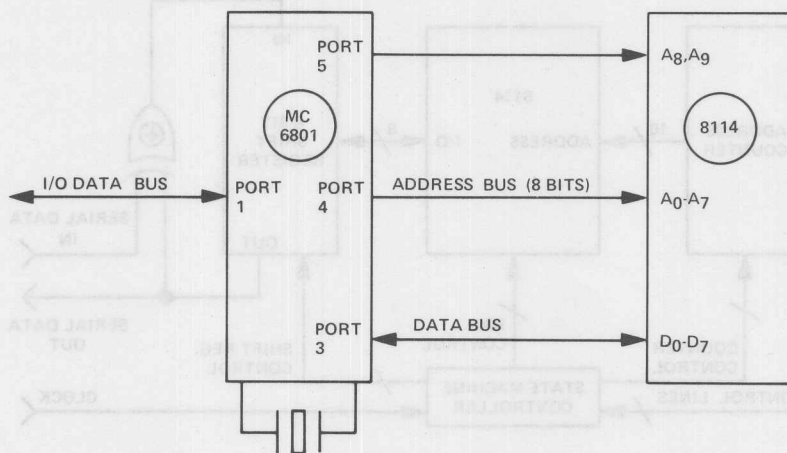





8K Static RAM Systems Applications

Two-Chip FFT Processor

In this application, an 8114 is used to increase the capacity of a single chip microprocessor. A fast fourier transform (FFT) processor can be built with only two 8114s and a single chip microprocessor such as the MC6801. The FFT processor will perform a 512 point complex transform in approximately 100 milliseconds (8-bit accuracy). Because the MC6801 operates in the expanded non-multiplexed mode, address and data to the RAMs are driven normally but the upper two 8114 address lines are controlled by ports. The internal ROM on the 6801 is used for program storage and sine/cosine table look up.

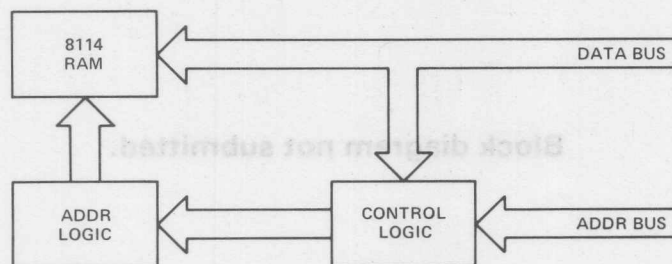





8K Static RAM Systems Applications

FIFO Application

Most 8-bit microprocessors have only one hardware stack, and the stack is limited to last-in, first-out operation. An 8114 could serve as an additional addressable list, with optional first-in, first-out capability. FIFO lists are useful for I/O buffering, task lists, etc.






8K Static RAM Systems Applications

Interface

This application for an 8114 is a two port RAM device designed to allow a high speed processor to access a slower peripheral without handicapping the processor. The processor loads RAM at it's maximum data transfer rate until all 1K locations are loaded; at this point the slower peripheral begins unloading the RAM at it's data transfer rate. Simultaneous transfer of data is ruled out but overlapping is allowed. This is a FIFO device with high input and low speed output.

Block diagram not submitted.




8K Static RAM Systems Applications

Traffic Counter

This application makes maximum use of the low power features of the L8114 in a battery powered classifying traffic counter. The counter would use a CMOS version of the 8048 family of microprocessors to read pulses from hose switches or inductive tuned loops in the traffic lanes. Data from the memory unit would be read once a week by a plug-in portable reader that also utilizes L8114 memory. The reader could be connected to a printing terminal at the office to produce hard copy of the weekly traffic count.

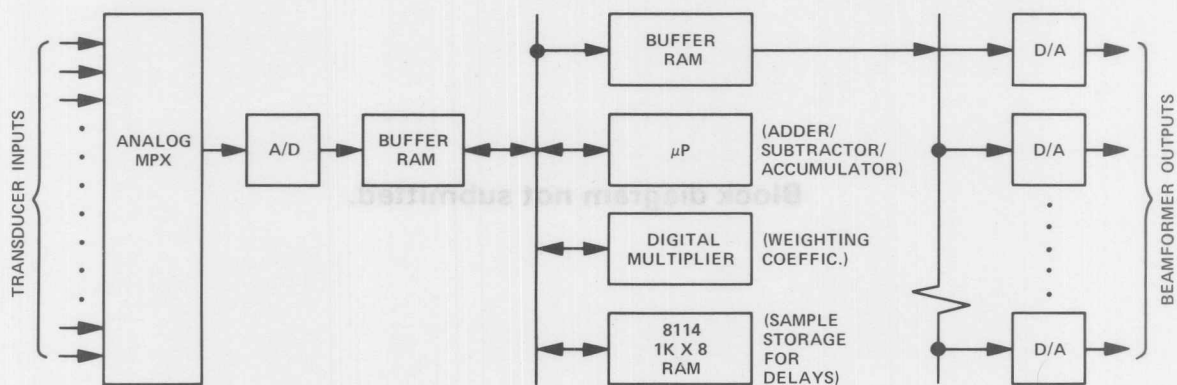
Block diagram not submitted.




8K Static RAM Systems Applications

Sample Storage for Digital Beamformer

The 8114 is addressed in a fashion to simulate a number of byte-wide shift registers which will provide the required input sample delays to form beams in a phased array system. A microprocessor and high-speed binary multiplier are used to provide shading and control the beam width.

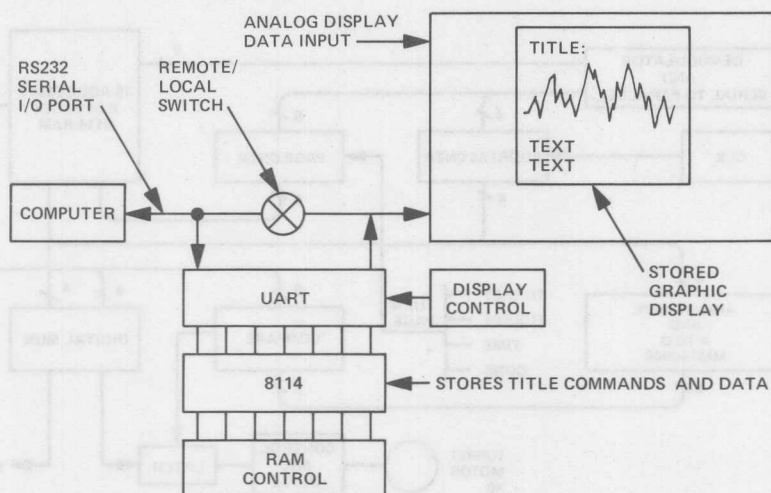





8K Static RAM Systems Applications

Terminal Interface

This application uses an 8114 RAM to store title commands to a graphic storage display unit. Instead of having computer tied up with titling each display, the titles can be stored in RAM and then recalled for each redisplay of new graphic data. The computer sends title commands and data only once; on subsequent redispays, commands and data for titles are read from 8114 static RAM.



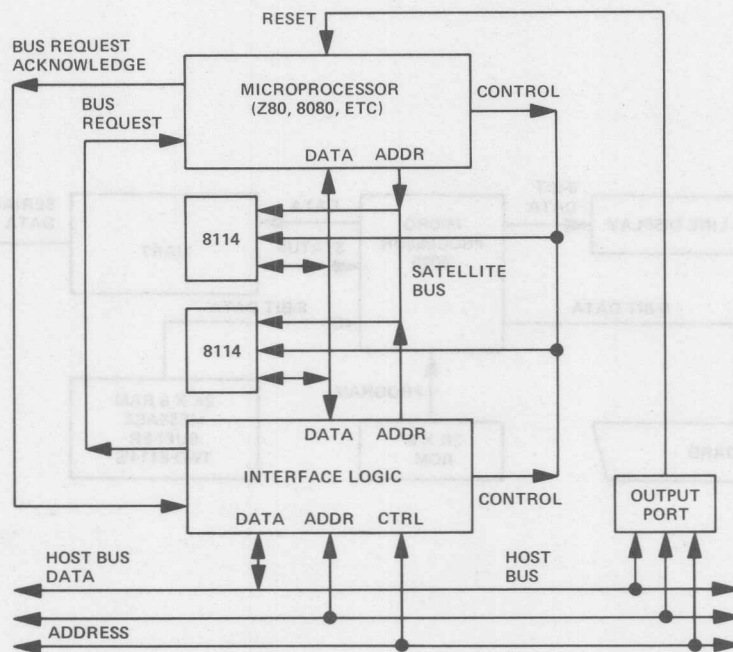



8K Static RAM Systems Applications

Interface

This application for an 8114 is an intelligent memory board for a microcomputer. The 8114's are isolated from the bus by buffers as usual but in this design a satellite processor is allowed access when the host computer is not reading or writing to those particular RAM's. The buffer control logic recognizes a host request and puts the host into a wait state until the satellite processor relinquishes the bus. In addition

the host may at any time reset the satellite processor. With this circuit, subroutines or driver routines may be read into the RAM's from storage and they will appear to "run themselves." Using this method, busy work can be off-loaded from the host to another processor (a cheap one!) for little more than the cost of the memory expansion; with no hardware alteration and with minimal software alteration.

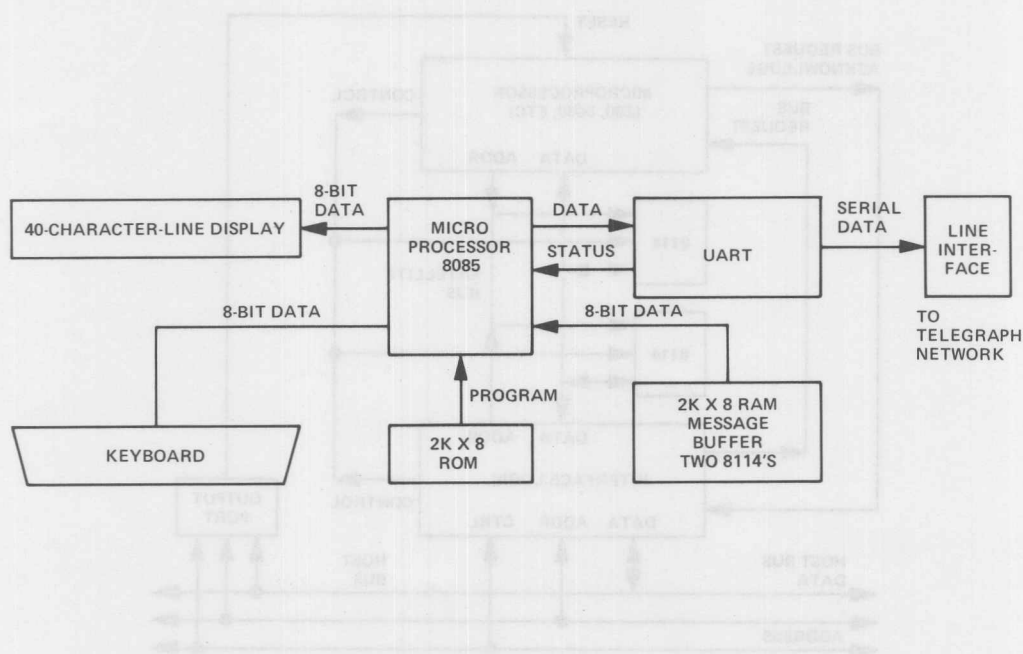





8K Static RAM Systems Applications

Telegram Transmitter Buffer

The design includes a microprocessor (8085), 2K X 8 ROM, 2K X 8 RAM, a 40 character display, a keyboard, a UART, and necessary interfaces. A message is typed in through the keyboard, displayed on the 40 character-line display, and stored in the buffer. When the message is ready, the CPU dumps the message out to the UART, and the message enters the telegraph network. This design replaces paper tape equipment.

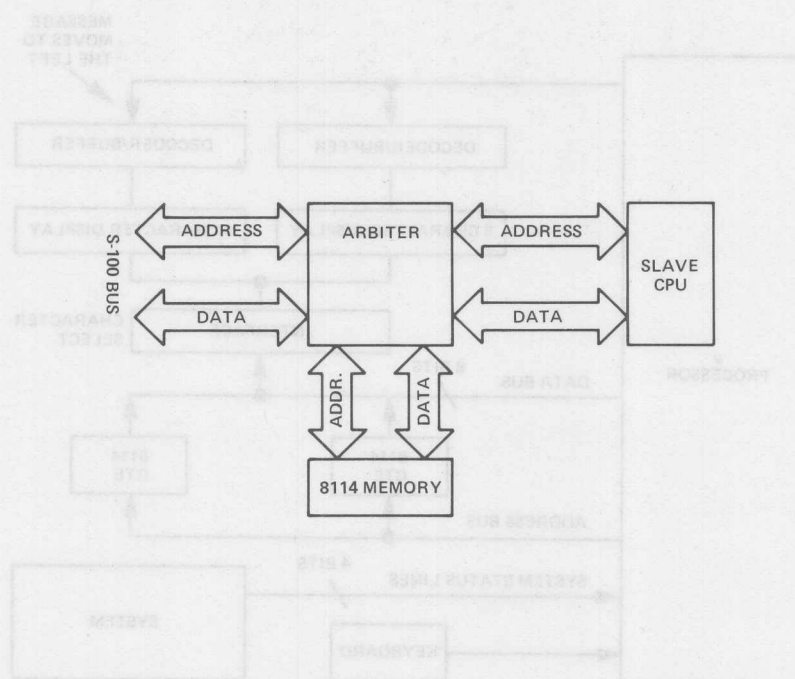





8K Static RAM Systems Applications

Communications

To increase performance of S-100 line computers, it is proposed to use multiple microprocessors instead of faster single micros. The best way to communicate between processors in the same box is to have an area of memory common to both microprocessors. In this system when the slave CPU's reset on power up they are held and a program is down loaded to them from the master CPU. The S-100 bus requires small size, and static memory greatly reduces the circuitry needed making the 8114 the RAM of choice for this application.

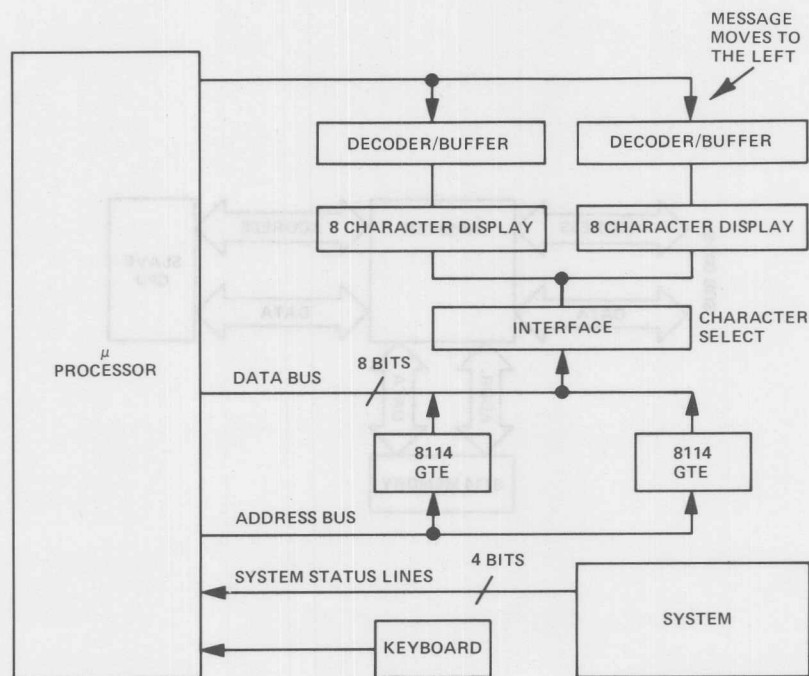





8K Static RAM Systems Applications

Digital Message Board

This application uses a rolling or scanning alphanumeric display. The message can be typed into a keyboard and the message is stored in two 8114s to provide data for a 14 segment display. The message is displayed on two eight character displays and the message appears to move across the display. The message can be typed into the keyboard and read by other people or the system status lines can recall or send warning or status messages that are stored in memory. The warning messages communicate important information to the system operator.

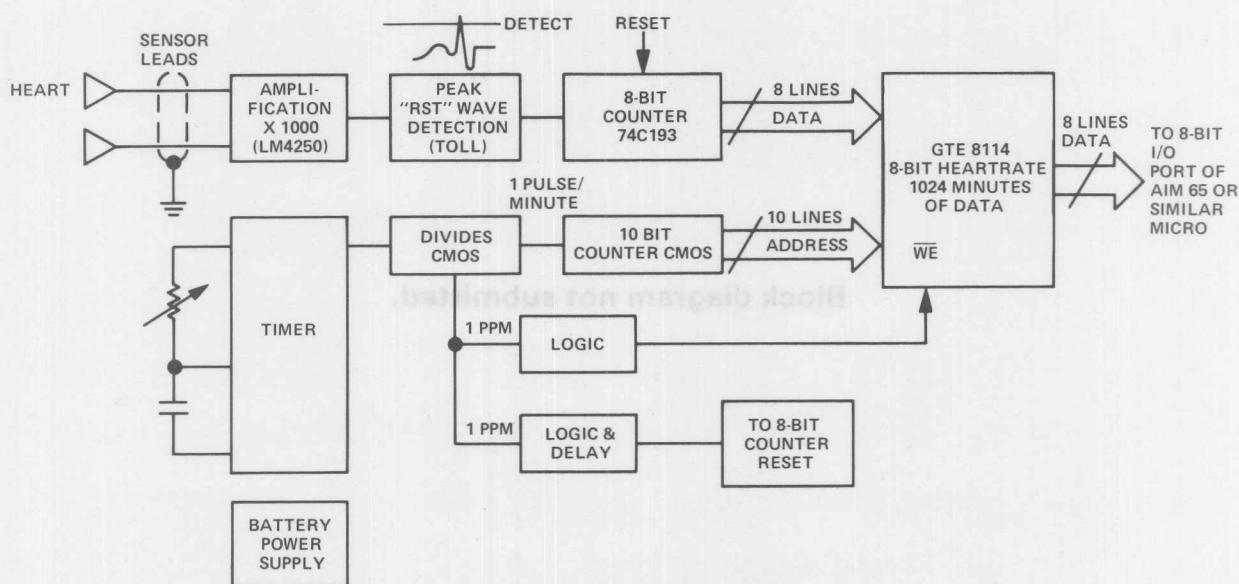





8K Static RAM Systems Applications

Stress Pattern Regulator

In this application, an 8114 is used to record heart rates. A 16-hour day (1024 minutes) worth of heart rate can be stored as a heart rate per minute (8-bit word). A microcomputer is used to read out the heart rate pattern and flag unusual stress, i.e., morning traffic, conferences, that should be avoided. The device may also be used by joggers, athletes, or weight watchers to achieve desired daily activity.

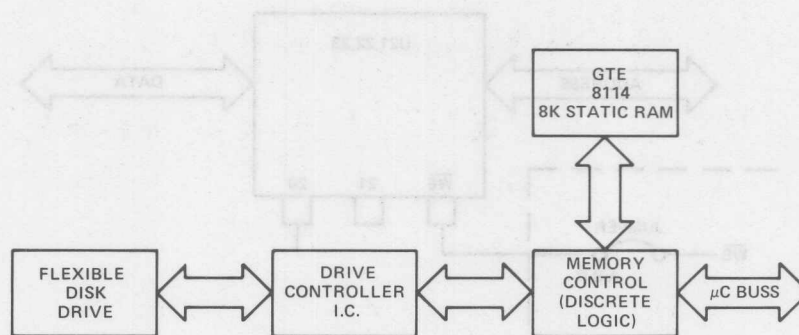





8K Static RAM Systems Applications

ms Disk Controller

This dedicated disk controller for a high performance flexible disk drive uses an existing disk controller I.C. that receives its commands from the "system" microprocessor. The memory control uses discrete logic to keep up with the demand rate, reads and writes the data to a single 8114 which provides a multiple sector buffer. This configuration allows the "system" to continue full response to other interrupts, and load and unload the disk buffer at processor rates.

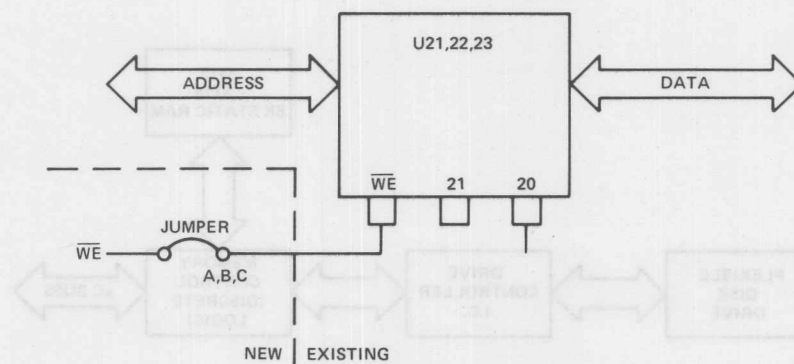





8K Static RAM Systems Applications

Development System

In this application, the 8114 is used in ROM/PROM/EPROM sockets of a SYM-1 to expand on-board memory (RAM) from 4K to 7K bytes. Addressing is handled by jumpering \overline{WE} to pins B, C, and D in address jumpers MAR U10 and U11 dividers.



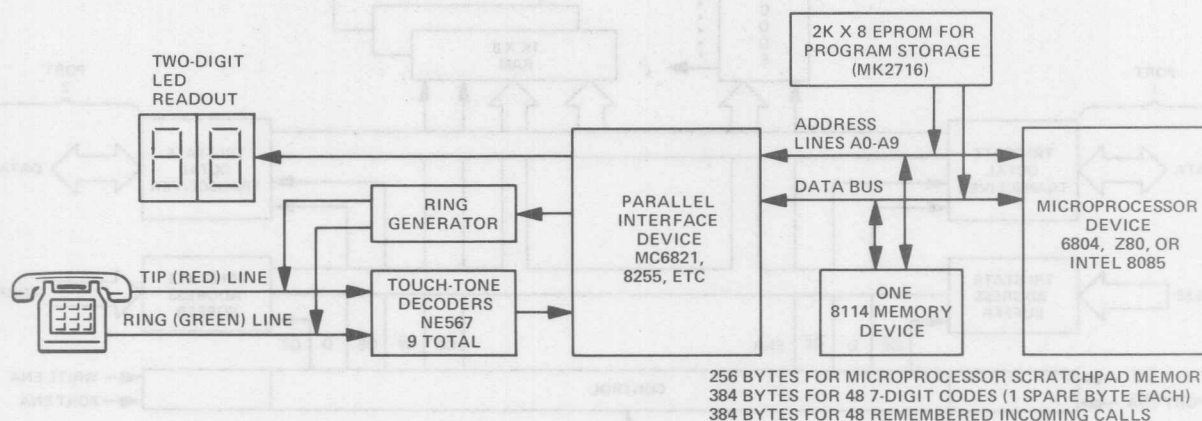



8K Static RAM Systems Applications

Telephone Number Extender (TNE)

The purpose of the TNE is to allow any individual to add 7 additional digits to their existing telephone number. This feature allows screening of incoming calls for reasons of eliminating obscene, nuisance or just leaving the line open for "important" or emergency calls only without changing the present phone number (when baby sleeping, etc.). In operation the TNE user programs the unit with up to 48 7-digit code

numbers which are to be given out to selected individuals. Any selected individual may call the TNE owner at which time the TNE will automatically answer, block the TNE owner's phone from ringing, and produce an electronic ring to the caller. The TNE will not generate its own electronic ring (for the TNE owner to hear) until the caller properly enters a 7-digit coded number in proper sequence.

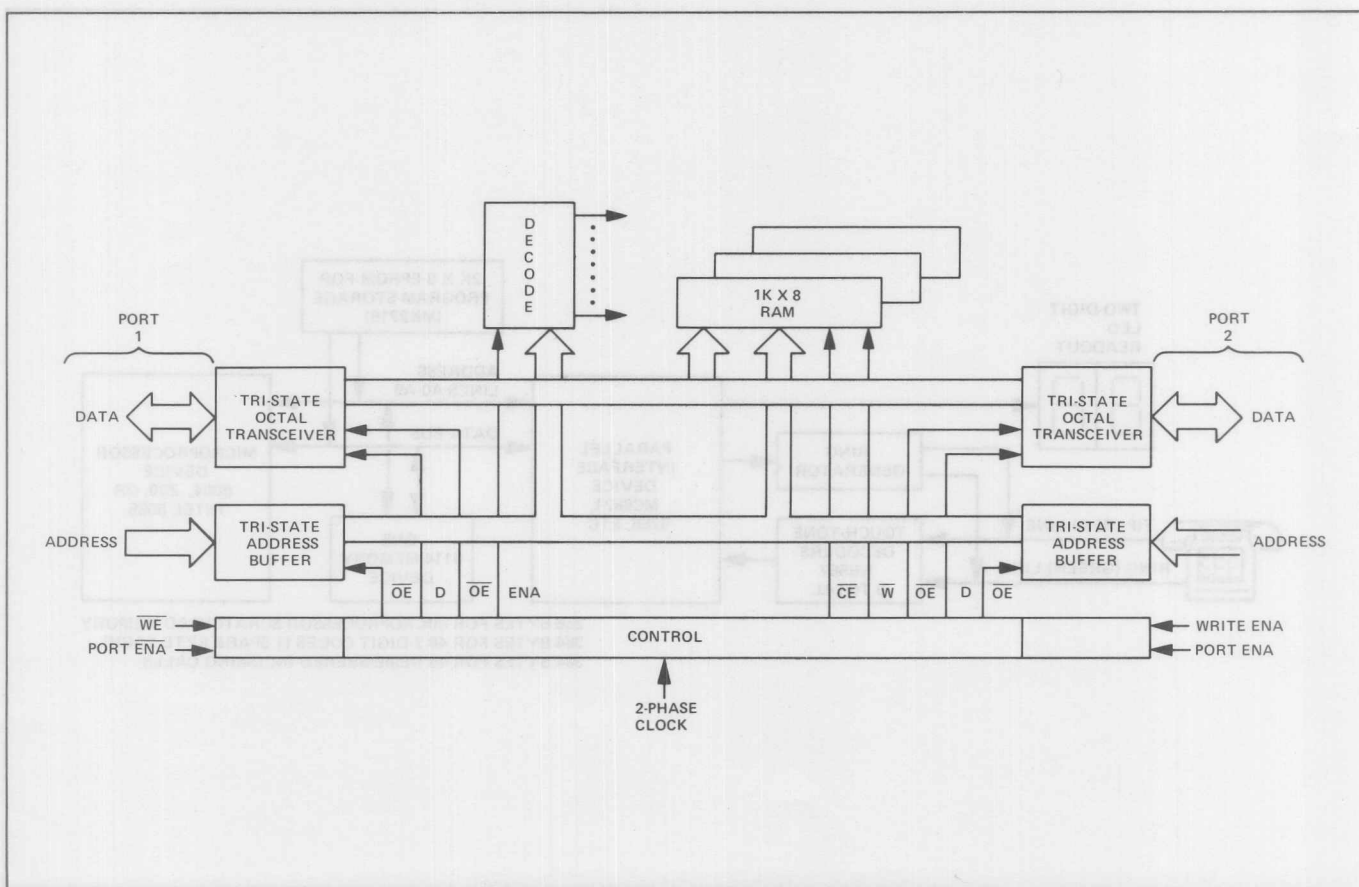





8K Static RAM Systems Applications

Computer Memory

This application is for an "N" K X 8 dual-port RAM. Synchronously or asynchronously (depending upon control specifications), two separate processors access the same RAM. A two-phase clock partitions cycle times to allocated memory access to either processor. Access protocol, clock speeds and "apparent" access time are set by the control block to emulate the rest of the memory or to emulate a particular chip.

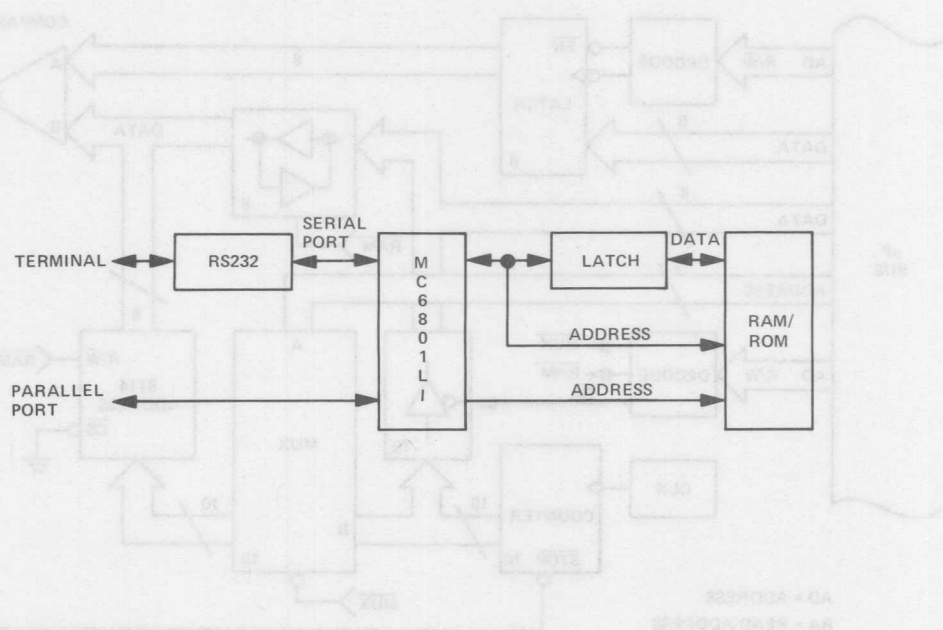





8K Static RAM Systems Applications

Development System

A cheap microprocessor development system is required to design with mask programmable microprocessor systems. Such a system allows the design to be debugged and optimized before being committed to on-chip ROM. A cheap system can be made to emulate the 6801 one chip microprocessor by using only an MC 6801L1, octal latch, RS 232 interface and RAM. Because the 6801 has 2K X 8 on-board ROM only two 8114s need to be used to emulate a one-chip microprocessor system, allowing for a physically small and inexpensive system.

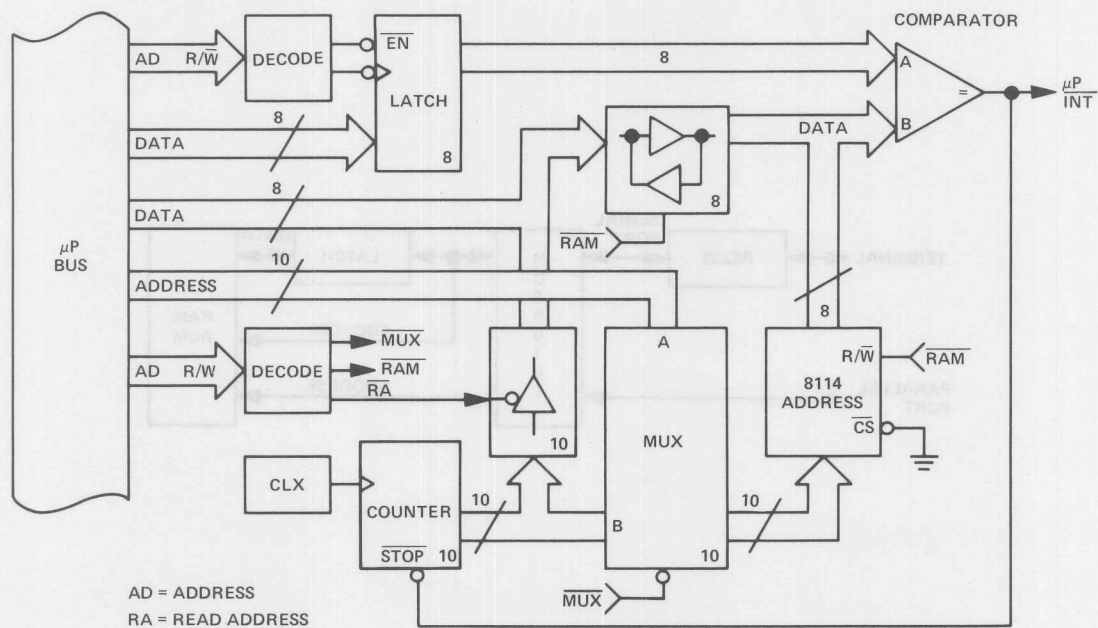





8K Static RAM Systems Applications

Computer Memory

The block diagram shows the 8114 used as a content addressable memory. Uses include a demand paged computer operating system or as hardware associative arrays for access to data by address of contents.

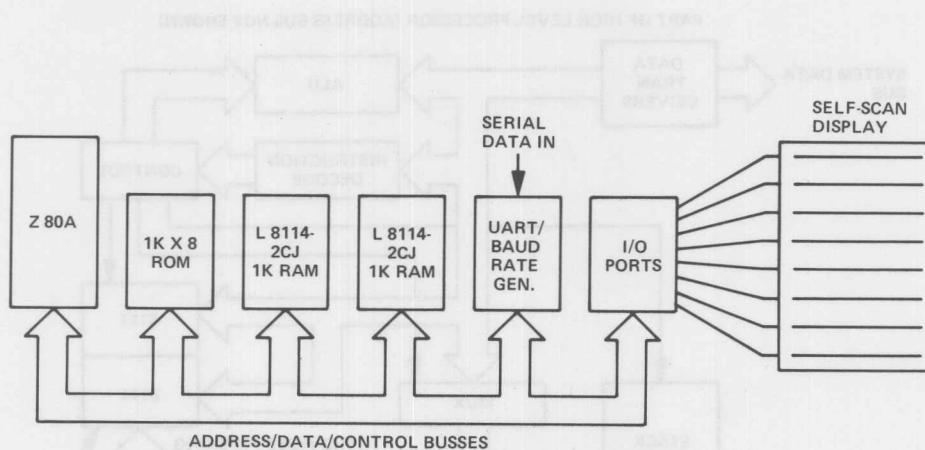





8K Static RAM Systems Applications

Display Refresh Memory

This application is for a scratch pad/display refresh memory for a compact terminal. Rather than a CRT, the terminal uses an 8 line X 32 character burroughs "self-scan" gas discharge display. Replacing the display driver assembly is a microprocessor-controlled display interface. This terminal requires two low power, 200 ns, 8114 RAMs.





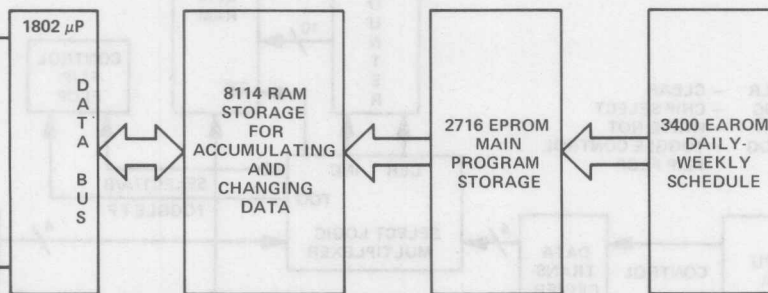
8K Static RAM Systems Applications


Home Energy Management

This home energy management system provides storage of information such as the high temperature, low temperature and highest wind velocity for a 24 hour interval, override temperatures and times for exceptions to a routine schedule and general register storage for the microprocessor. The system would control a home heating and cooling system, humidifier, fresh air inlet and hot water heater based on a daily schedule stored in EAPROM with temperature set backs according to the day of the week and use of fresh air to heat or cool when the outside temperature and humidity would allow.

INPUTS
OUTSIDE TEMP
INSIDE TEMP
OUTSIDE HUMIDITY
INSIDE HUMIDITY
WIND VELOCITY
HEX KEYBOARD
REALTIME CLOCK

OUTPUTS
HEATING
COOLING
FAN
HUMIDIFIER
HOTWATER HEATER
FRESH AIR INLET

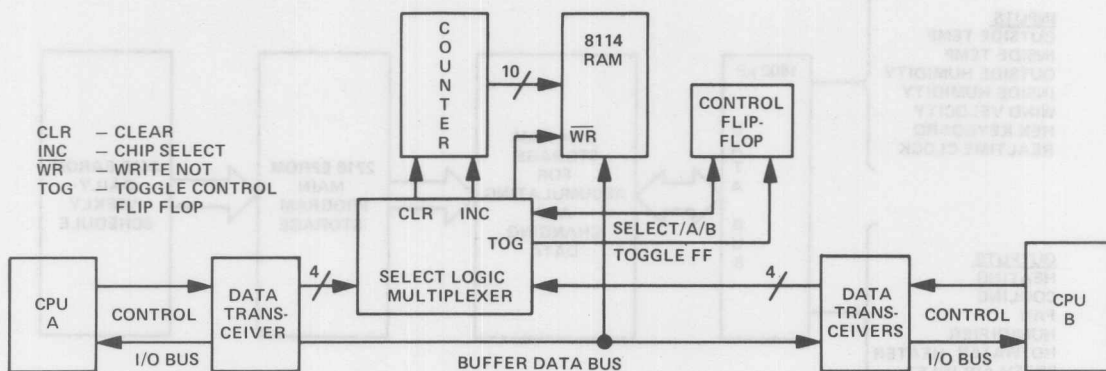





8K Static RAM Systems Applications

Asynchronous Interprocessor Message Buffer

The design is a 6-chip buffer which allows messages of one to 1024 bytes. Access to the 8114 buffer is controlled by the flip flop which designates CPU 'A' or CPU 'B'; the selected CPU can clear the counter. Any data access causes the counter to be incremented after access is complete. This process is used to read or write a message. When a message has been written, the CPU toggles the control flip flop; the other CPU can read the message and write a response. The advantages of the design are low cost and variable rate transfers similar to a FIFO but without the cost of a FIFO.

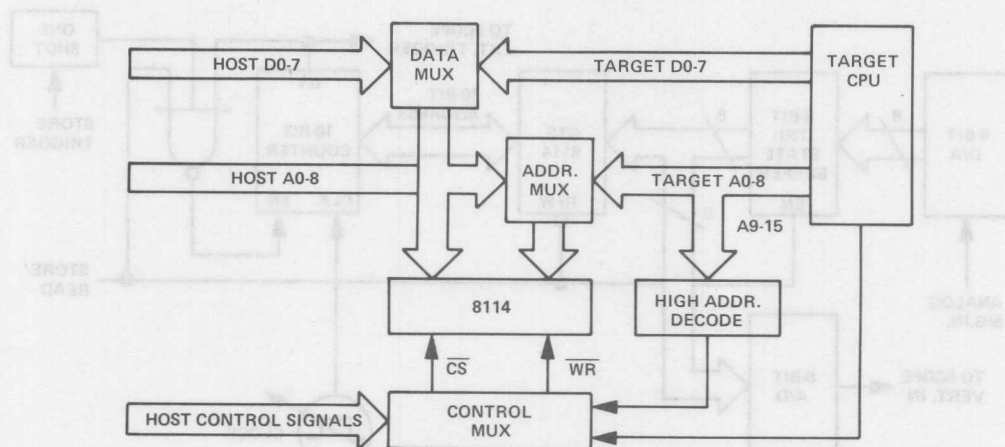





8K Static RAM Systems Applications

Interface System

The interface is an inexpensive single-board universal microprocessor program development device, which functions as a personal computer peripheral. The device provides an interface between the host computer and a target microprocessor contained on a small adapter card. The 8114 serves as a writeable program store with host and target multiplexed to it under host control. The operating system, loaded into the host from a cassette tape, allows the user to write programs into the shared RAM from the host keyboard, to be subsequently executed by the target. This has proven especially valuable for educational purposes.

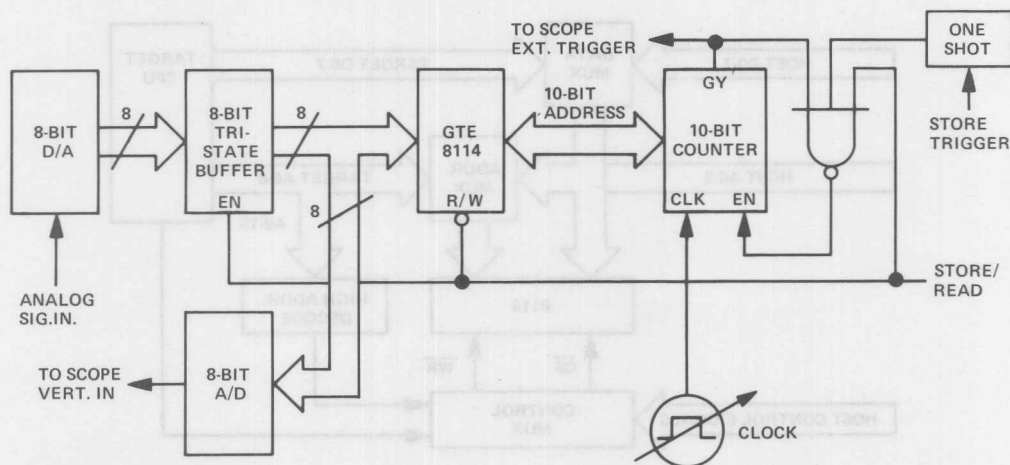





8K Static RAM Systems Applications

Storage Oscilloscope

The described circuit is a low cost adaptor to convert a standard non-storage oscilloscope to a digital storage oscilloscope. Resolution would be 256 points (vertical) with 8 bit D/A and A/D converters. Intended mainly for audio (due to access time of the memory and settling time of the converters) up to one cycle of 2.8 KHz or 10 cycles of 28 KHz could be stored in RAM in one-shot fashion. This assumes a 350ns access time for the 8114 memory. Readout would be continuous with external triggering. The clock that drives the counter would be variable with a 2.8 KHz upper limit. The clock frequency determines the number of cycles of the waveform to be stored.

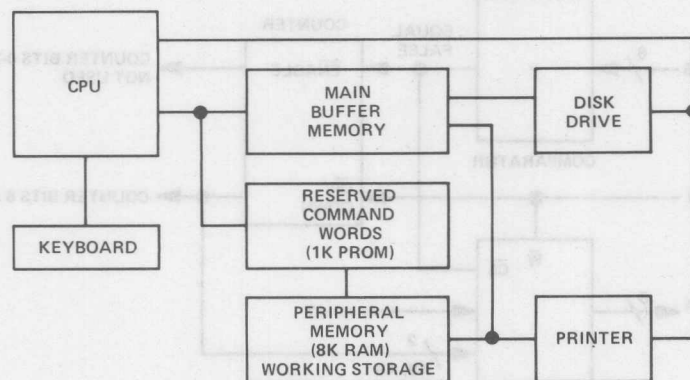





8K Static RAM Systems Applications

Special Symbols For Word Processor

Text editor operator uses ASCII character composites from keyboard to create specialized graphics for one-time (or permanent) use with associated text. These are developed in auxiliary memory file, and molded into text printout at applicable points, via a set of reserved commands maintained in PROM.

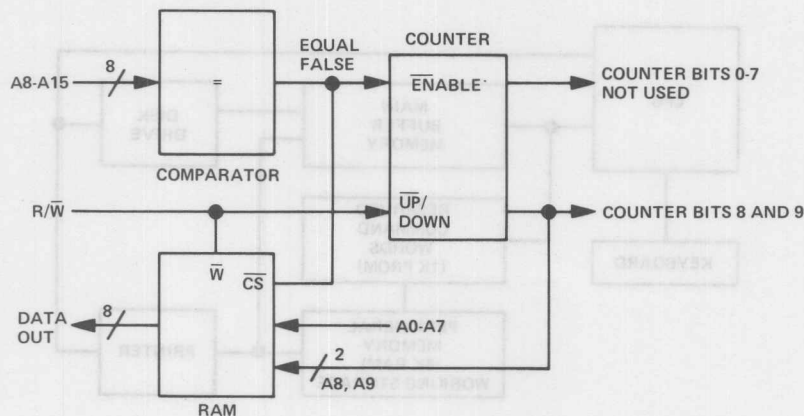


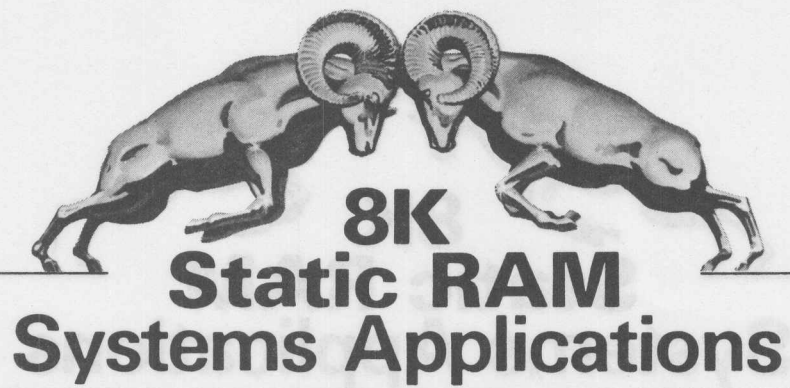


8K Static RAM Systems Applications

Computer Memory

The circuit described extends the processor stack of the 6502 microprocessor using an 8114 with a 10 bit up/down counter and a comparator to recognize page 1 (stack) addresses. When a write to page 1 occurs, the counter is incremented; it is decremented for a read. The two most significant bits of the counter provide the two most significant bits of address to the RAM, and the remaining address comes from the bus. The comparator enables both the counter and the RAM. This extends the depth of the stack by a factor of 4. The counter "clear" signal is the system reset line.

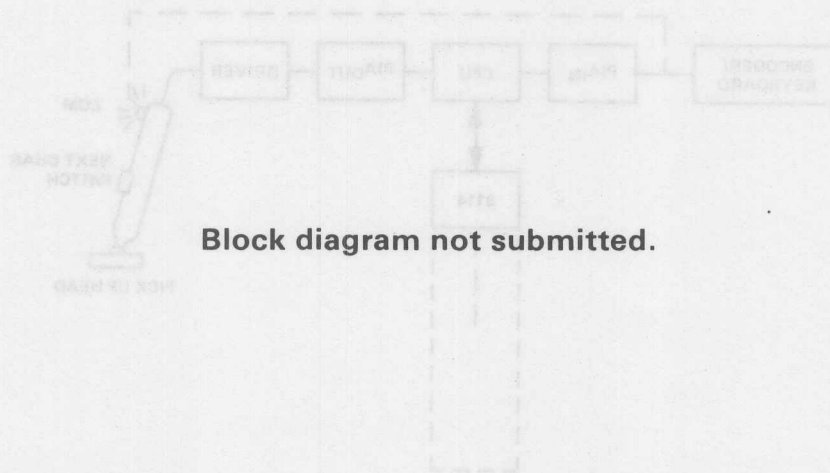





8K Static RAM Systems Applications

Biomedical Interface

This device utilizes an 8114 as part of a miniaturized interface and command unit to be installed, surgically, with an artificial heart unit. The interface portion of the circuit monitors brain waves and switches command circuits to a miniature brushless DC motor and pump which comprise the heart unit.

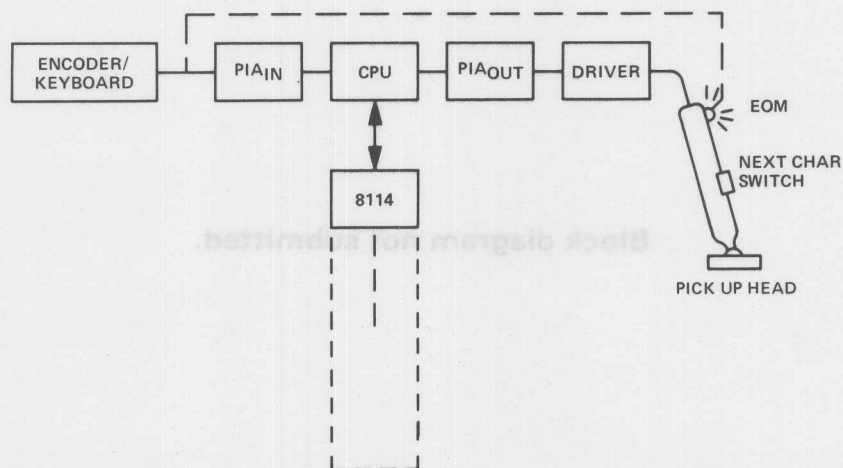





8K Static RAM Systems Applications

Terminal Interface

This single character printer uses a matrix impact head. A short message is entered on the keyboard and the "next character switch" calls out consecutive characters until "end of message" is reached. This application is intended for use by draftsmen where CAD systems are not available but where type printing is appropriate.

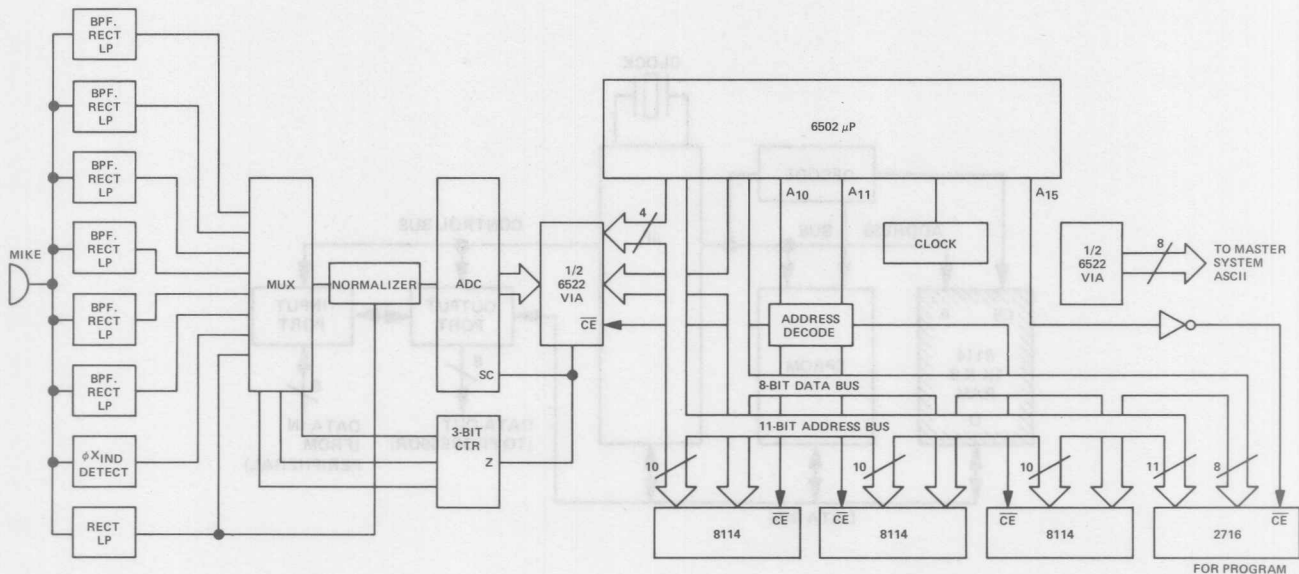





8K Static RAM Systems Applications

Speech Recognition System

This vocabulary speech recognition system requires 128 bytes of memory for each word to be recognized plus one kilobyte of workspace. The 6502 processor uses the first 512 bytes for the system to recognize 12 words.

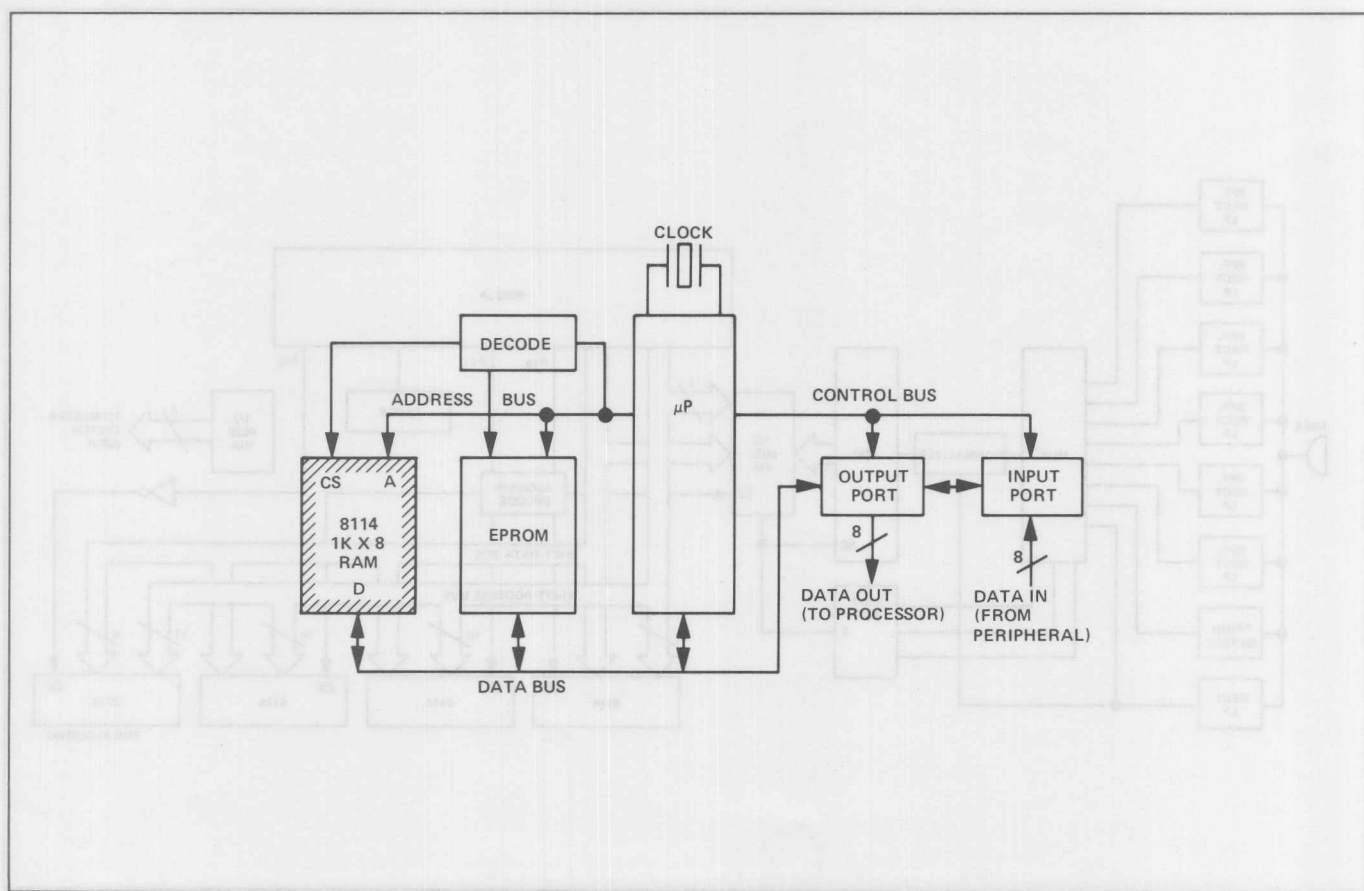





8K Static RAM Systems Applications

Miniature Data Buffer

Many microcomputer systems require the processing of 8-bit parallel data supplied by an external peripheral which is not synchronized with the main processor. Often, re-synchronization is done with first-in-first-out (FIFO) memories, but these devices require many IC's for timing and control. This basic microcomputer system, however, can (with simple control software) perform this re-synchronization for as much as 1000 bytes using only 5 or 6 IC's, depending upon microprocessor used. A similar FIFO system would require over 70 IC's for the same buffer depth. This buffer, on the other hand, may be built on a single 2½ X 5" logic card.

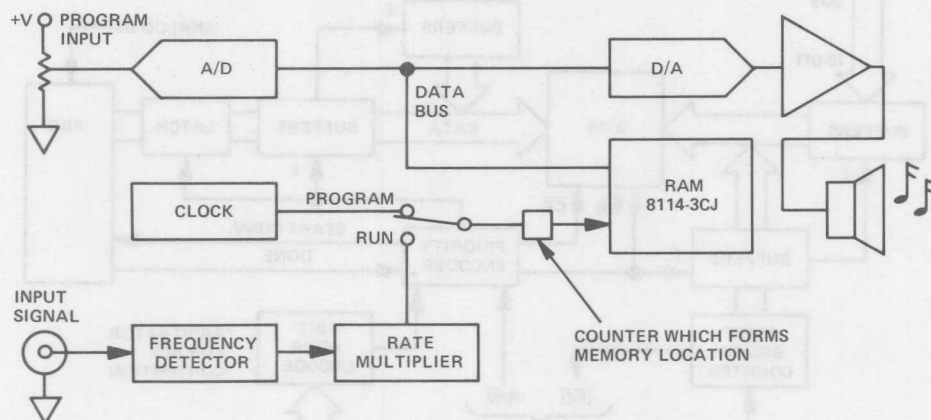





8K Static RAM Systems Applications

Electronic Music Synthesis

In the program mode, the user enters an arbitrary waveform into the memory (the clock steps through the memory at a convenient rate). In the run mode, the memory is clocked at a rate which is an exact multiple of the input frequency such that one full pass through memory is made during the period of the input. Hence, output frequency equals input frequency (fundamental) but the harmonic structure is entirely different and an infinite variety of sounds is possible.

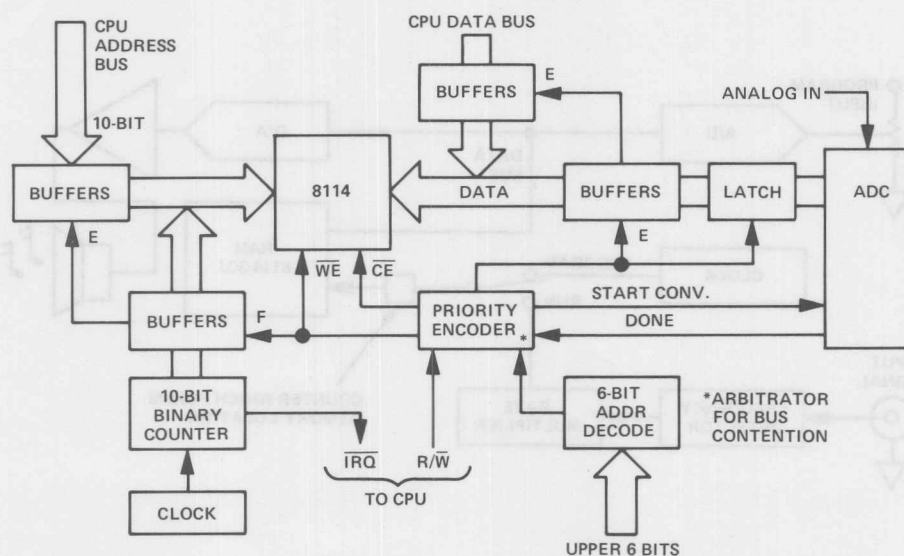





8K Static RAM Systems Applications

Remote Data Logger

The circuit reads and loads a 1K X 8 bit RAM with converted 8-bit data. When the RAM is full (or has reached another arbitrary limit), the CPU is interrupted and unloads the data block into it's own RAM for progressing into mass non-volatile storage. Advantages include the saving of 1023 interrupt and return from interrupts (22,506 cycles for a 6800 CPU). Alternatively, the IRQ can be used to "wake up" a battery powered CPU and tape or disk drive periodically, thus saving power.

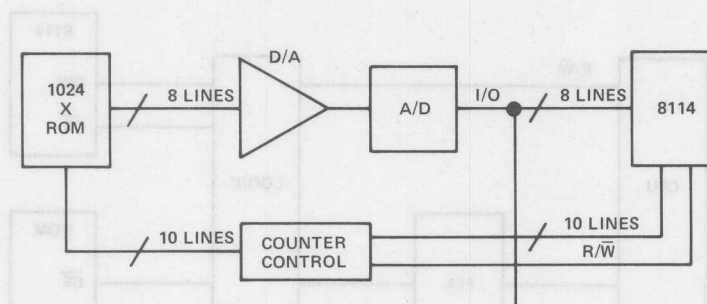





8K Static RAM Systems Applications

MOR D/A or A/D Tester

The 8114 is used to record the output of an 8-bit A/D converter. An arbitrary waveform is output from a 2708-type ROM into a D/A converter. A variable clock can adjust the cycle time to the point that either the D/A or A/D will start to fail. Thus, based upon the input data and the resulting output, one can assess where the weak spots are.

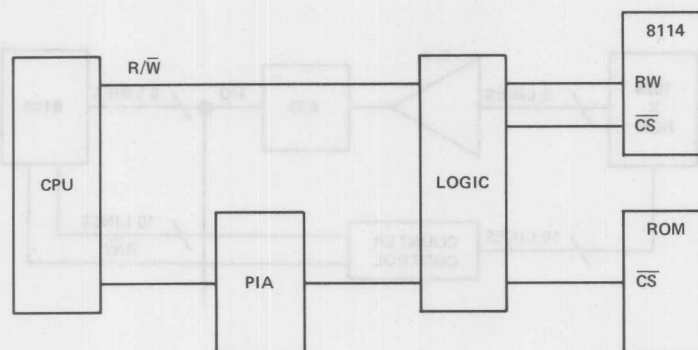





8K Static RAM Systems Applications

User Alterable 'Shadow' ROM

Much software, such as microprocessor monitor programs, is provided in ROM. Usually the user would like to customize such programs for systems use. In the system, the 8114 is configured by software controlled logic, as a write-only memory at the same address as the read-only ROM. Software would perform a read-write at each ROM address, thus copying the ROM into the 8114. The software controlled logic would then disable the ROM and enable the 8114 as a read-write memory. The user then may change the program as desired.

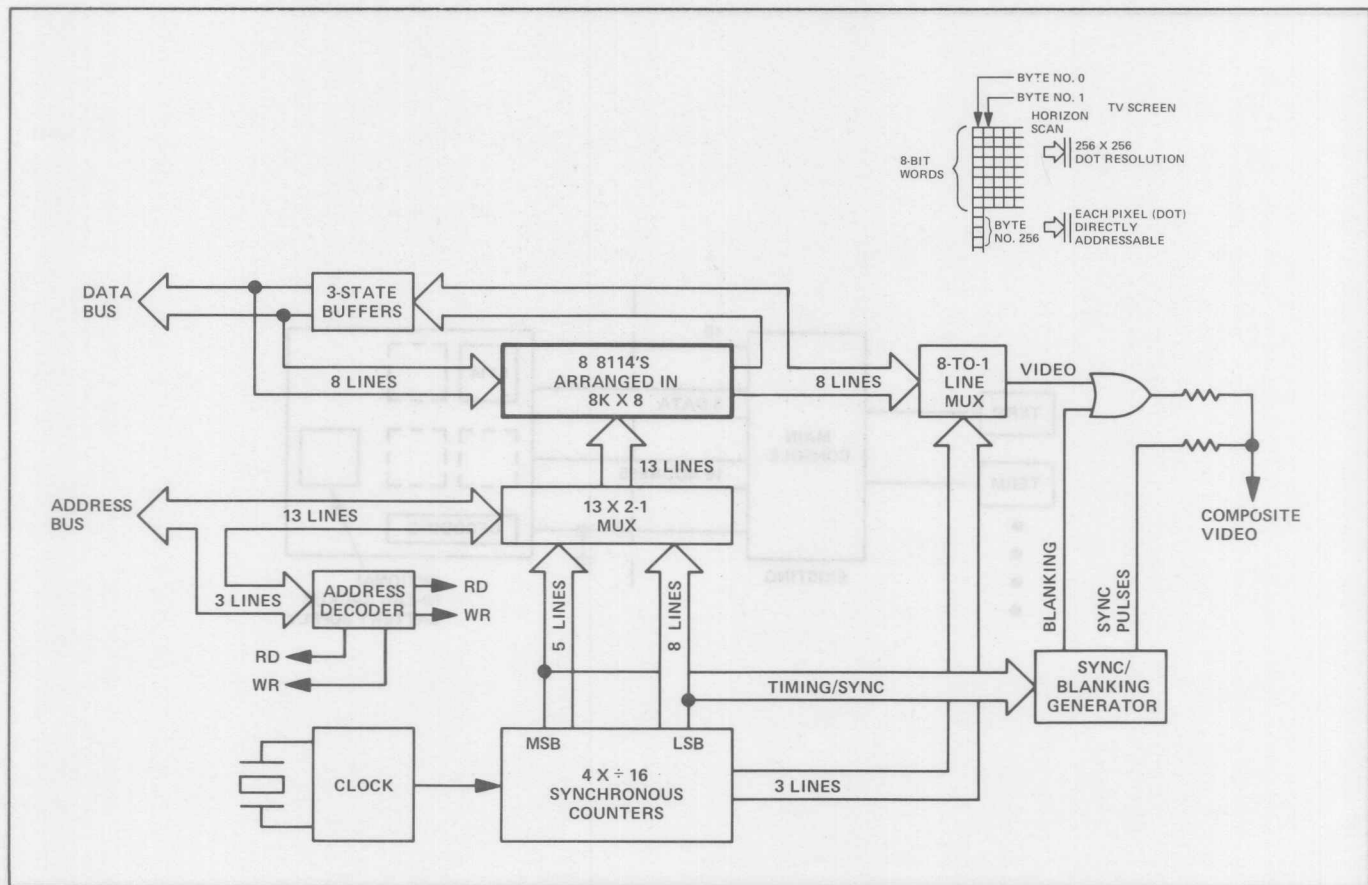





8K Static RAM Systems Applications

Display System

This memory mapped video system is completely software driven requiring no hardware character generation. An ASCII 5 X 7 matrix character set can be stored in part of the video memory that is unused during the vertical sync and retrace. Each memory byte represents one 8-pixel vertical column of dots. The system can be used for character generation but requires software overhead for character generation.

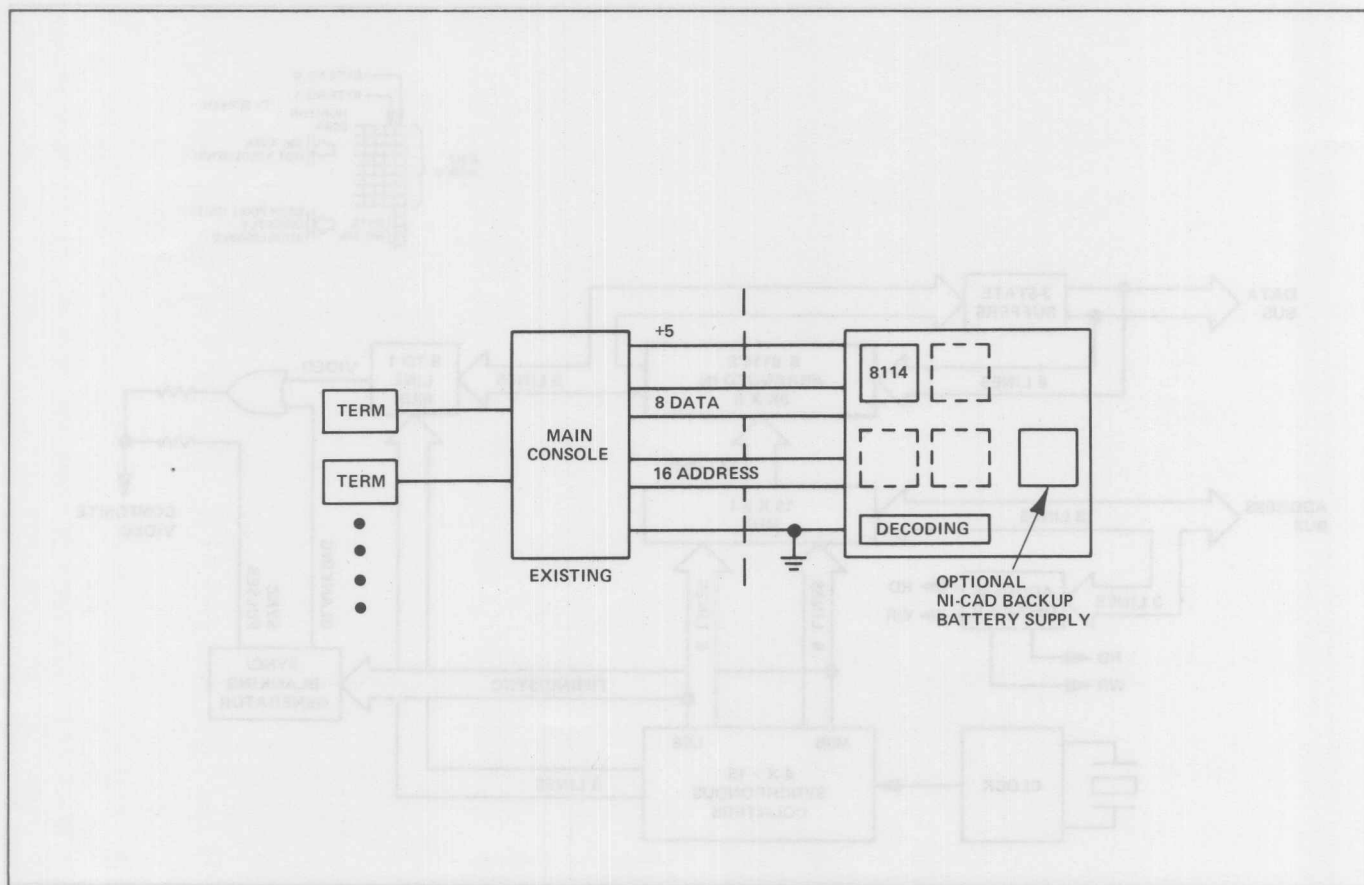


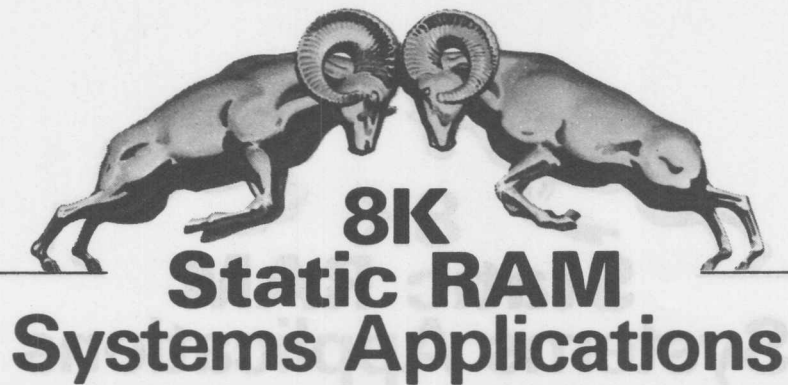


8K Static RAM Systems Applications

Education System

This application is for a memory element for a data storage module that will plug into a computerized education system. This addition will be used for storing and transferring predigested performance data to other equipment and systems.



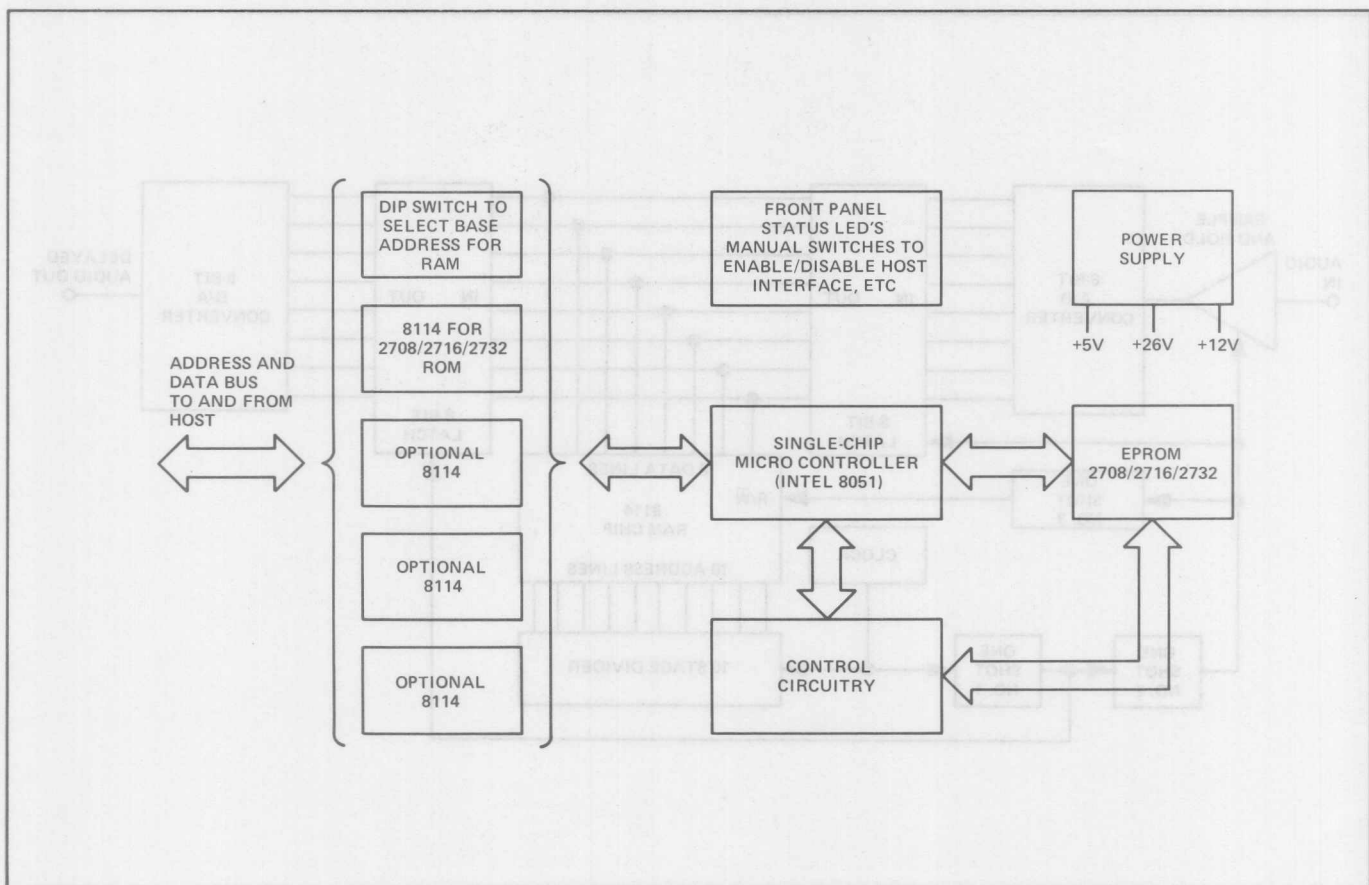



8K Static RAM Systems Applications

Smart EPROM Programmer

As shown in the block diagram, a single chip micro-processor controlled EPROM utilizes the byte wide 8114 in an inexpensive, versatile configuration. The computer should be a single chip with on-board ROM for all codes required to handle timing and programming of the EPROMs. The host computer uses 8114s that are part of the controller as regular memory to fully debug code that is to be burned into the EPROM. When ready, the programmer is signalled and handles transferring data from RAMs in EPROM and burning it in. The programmer will disable RAM from the host computer during burn-in

and do automatic verification that RAM and EPROM are identical. Before the actual burn-in begins, the programmer checks the EPROM to make sure all bits are cleared. The programmer could be designed to handle 2707/2716/2732 EPROMs depending on the number of 8114s provided. During regular operation, the host computer could use RAM on the programmer as standard memory; the programmer could be used by any host processor. The RAM can be set up from the programmer to be accessed as a contiguous block starting at any base address desired.



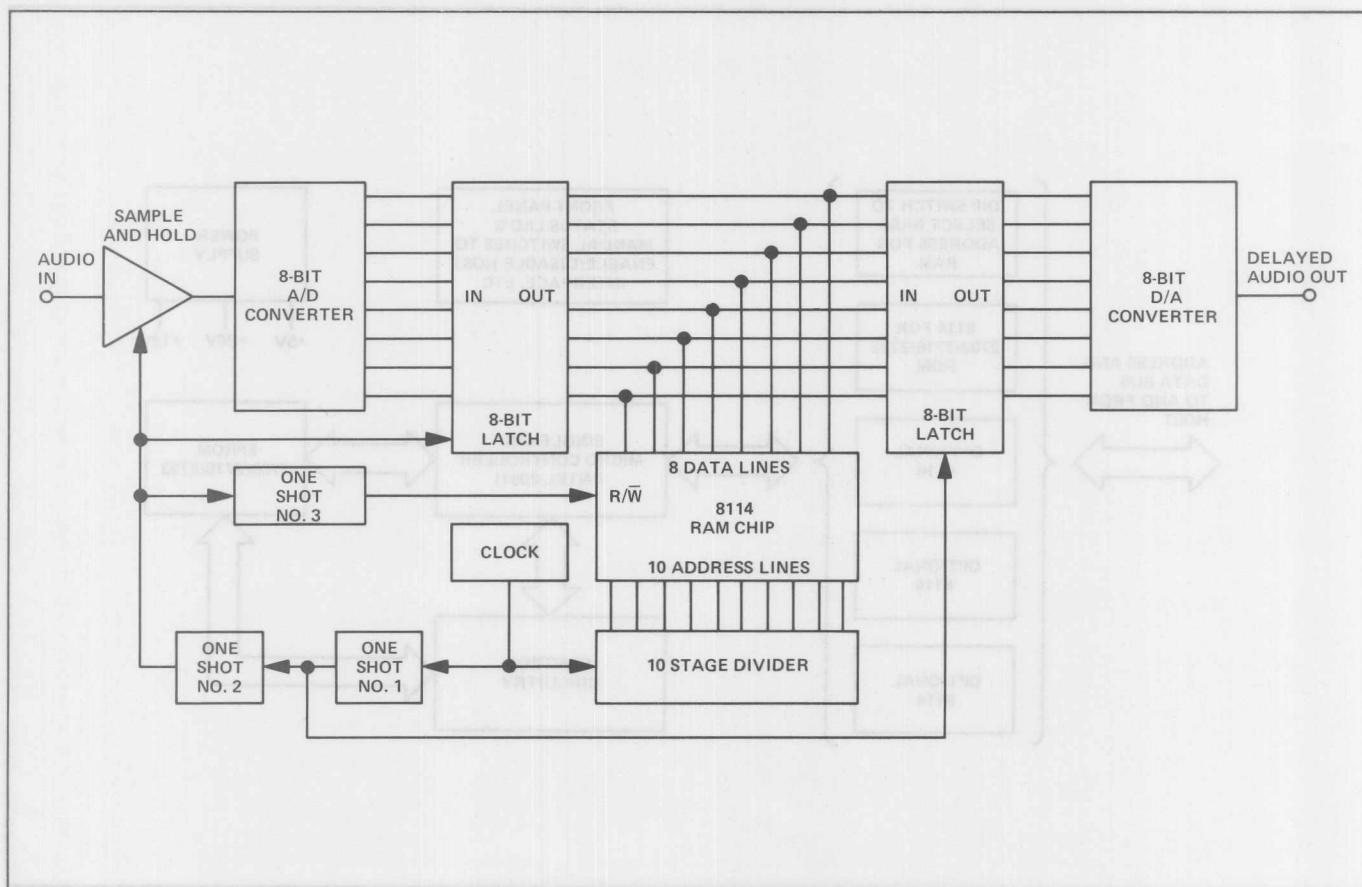



8K Static RAM Systems Applications

Audio Delay Line

The block diagram shows an audio delay line using the 8114 as a byte wide shift register. The RAM is continuously cycled through its entire range of addressing by the ten stage divider. The one shots provide proper timing for the system. Each clock pulse increments the address and triggers one shot No. 1 which latches data from the RAM to feed the D/A converter. The second one shot is triggered by

the falling edge of one shot No. 1 and samples the input audio signal which permits the A/D conversion. One shot No. 3 is then triggered by the falling edge of one shot No. 2 and writes the data present on the front latch to the RAM. The data being written is not fed for 1023 cycles, and thus is delayed from the original signal. Possible uses for this circuit include flanging and reverberation.






8K Static RAM Systems Applications

Terminal Control System

The control system for an existing graphics terminal used a 128 byte RAM for a small communication buffer (25 bytes), scratch pad, and various registers. To upgrade this terminal and to provide higher throughput and efficiency, an extended communication buffer was required. Because space, or board real estate is the biggest problem with portables, it

was impractical to add RAM. However, as an alternative, the 8114 was added to the circuit using existing 2716 EPROM sockets (the 8114 and 2716 are compatible) just by changing one jumper. The result was a 1K communications buffer added to the terminal with minimal hardware changes and maximum utilization of board real estate.

Block diagram not submitted.

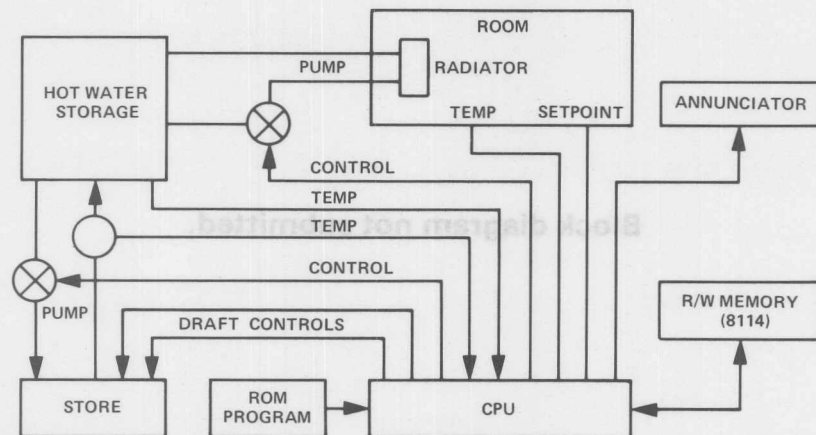



8K Static RAM Systems Applications

Home Heating Monitor

The increased use of wood as a home-heating fuel is widespread. Wood burners are notoriously inefficient, however, especially when manually controlled by typical homeowners trying to achieve a long, slow burn. Since the highest efficiency occurs at a high burning rate, a heat storage medium is essential (water, in this case) to prevent excessive temperature fluctuations. This also facilitates distribution throughout the house. Measurements of water, flue, outside air, and inside air temperatures plus the desired inside

temperature are inputs to the control algorithm. The optimum draft and damper positions and circulating pump state are then calculated and set. An annunciator signals the need for more wood when the water is no longer hot enough to maintain the desired temperature. Knowing the outside temperature permits compensating for the time lag in reheating the water. Control of solar collectors could also be included.

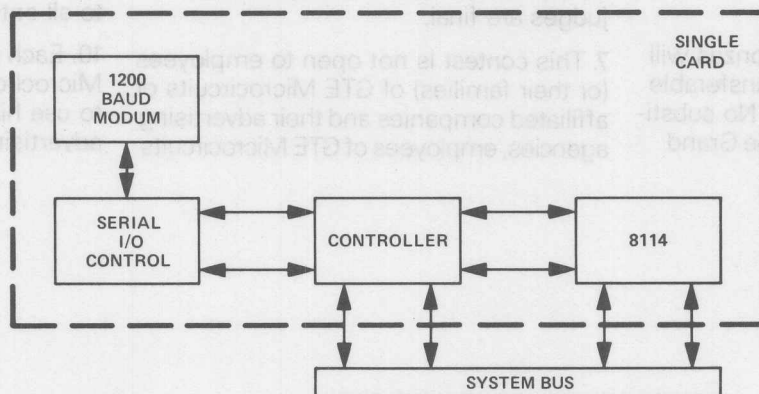




8K Static RAM Systems Applications

FIFO

In this application, the 8114 serves as the data I/O buffer for use with a bus oriented 1200 baud Bell-type 202 compatible modem, as shown in the block diagram, the bus is buffered from the serial I/O stream. Basically, the system bus would provide data to be output as fast as the 8114 could accept it (much faster than 1200 baud) as the data is also taken from the 8114 in a round robin method. For serial output, the bus becomes available for other data transfers. The basic idea holds for receiving data as the controller would be set up for bus transfers on certain character recognition.





OFFICIAL RULES

1. To enter, complete the official entry form or answer in your own handwriting all of the requirements of the entry blank on a plain sheet of paper with your name, address, zip code and telephone number. All entries must be complete to be valid.

2. Official entry blanks may be obtained from any GTE Microcircuits authorized distributor.

3. The contest will be open from October 1 through December 31, 1980 both dates inclusive.

4. Mail your entry to "The Great GTE Microcircuits 8K Static RAM Contest," c/o GTE Microcircuits, P.O. Box 3163, Tempe, Arizona 85281. To be eligible for a monthly prize, entries must be postmarked on or before the last day of the month. To be eligible for the grand prize, or the second prize, entries must be postmarked on or before December 31, 1980 and received no later than January 10, 1981. Each entry must be mailed separately.

5. All entries must be original applications and the entrant must be free to submit the application for consideration in this contest.

6. No purchase necessary. All prizes will be awarded. Prizes are non-transferable and non-redeemable for cash. No substitution of prizes is permitted. One Grand

Prize, GTE Sylvania VideoTape Recorder with Camera (Retail Value \$2,550.00); One Second Prize, GTE Sylvania Supersound 21" Color TV Console (Retail Value \$890.00) and 27 Monthly Prizes, GTE Sylvania Compact Stereo with speakers and two microphones and cassette player (Retail Value \$350.00). All entries will be judged by an independent engineering firm. Entries will be judged based on ease of use, practicality of application, social and environmental benefits, and ease of understanding. Three monthly prizes will be awarded in each of three GTE Microcircuits sales areas within the U.S. and Canada. Winners will be selected by the 10th of each succeeding month. Monthly winners become eligible for the grand prize and second prize. Grand prize and second prize winners will be selected by January 19, 1981 and will be notified by registered mail. Prizes must be claimed at the distributor location where the entry blank was obtained not later than 30 days of notification or the prize will be subject to forfeiture, in which case a substitute winner will be selected. All decisions of the judges are final.

7. This contest is not open to employees (or their families) of GTE Microcircuits or affiliated companies and their advertising agencies, employees of GTE Microcircuits

authorized distributors or their agencies, or GTE Microcircuits manufacturers representatives or their agencies.

The contest is void where prohibited by law. All Federal, State and local regulations are applicable. **ALL FEDERAL, STATE AND LOCAL TAXES ON PRIZES, IF ANY, ARE THE RESPONSIBILITY OF THE INDIVIDUAL WINNER.**

Winners may be required to execute further documents, including a name and likeness release. All entries and the contents thereof become the property of the GTE Microcircuits Division of the GTE Products Corporation.

8. A list of winners can be obtained by sending a stamped, self-addressed envelope to: Winners List, The Great GTE Microcircuits 8K Static RAM Contest, P.O. Box 3163, Tempe, Arizona 85281

9. All entrants will receive, for experimental purposes, a free 8K N-MOS static RAM, part number 8114-3CJ (Retail Value \$22.25) and a data sheet explaining its use. At the close of the contest, all winning entries will be published in catalog form and distributed to all entrants.

10. Each winning entrant grants to GTE Microcircuits without limitation the right to use his name and likeness for any advertising and promotion purposes.



GTE Microcircuits 8K Static RAM Contest Entry Evaluation Form

1. Unique and appropriate use of the 8K static RAM.

- A. Patentability (0-10) _____ ()
B. Entertaining and Instructional (0-10) _____ ()
C. Importance of 8114 Characteristics (0-15) _____ ()

2. Marketability and Cost Effectiveness

- A. Cost Effective compared to Other Ways (0-5) _____ ()
B. Cost Effective New Way (0-5) _____ ()
C. Potentially Saleable Product (0-5) _____ ()
D. Known Market Channels Available (0-5) _____ ()
E. Will Product Create a Market (0-5) _____ ()

3. Ease of Implementation.

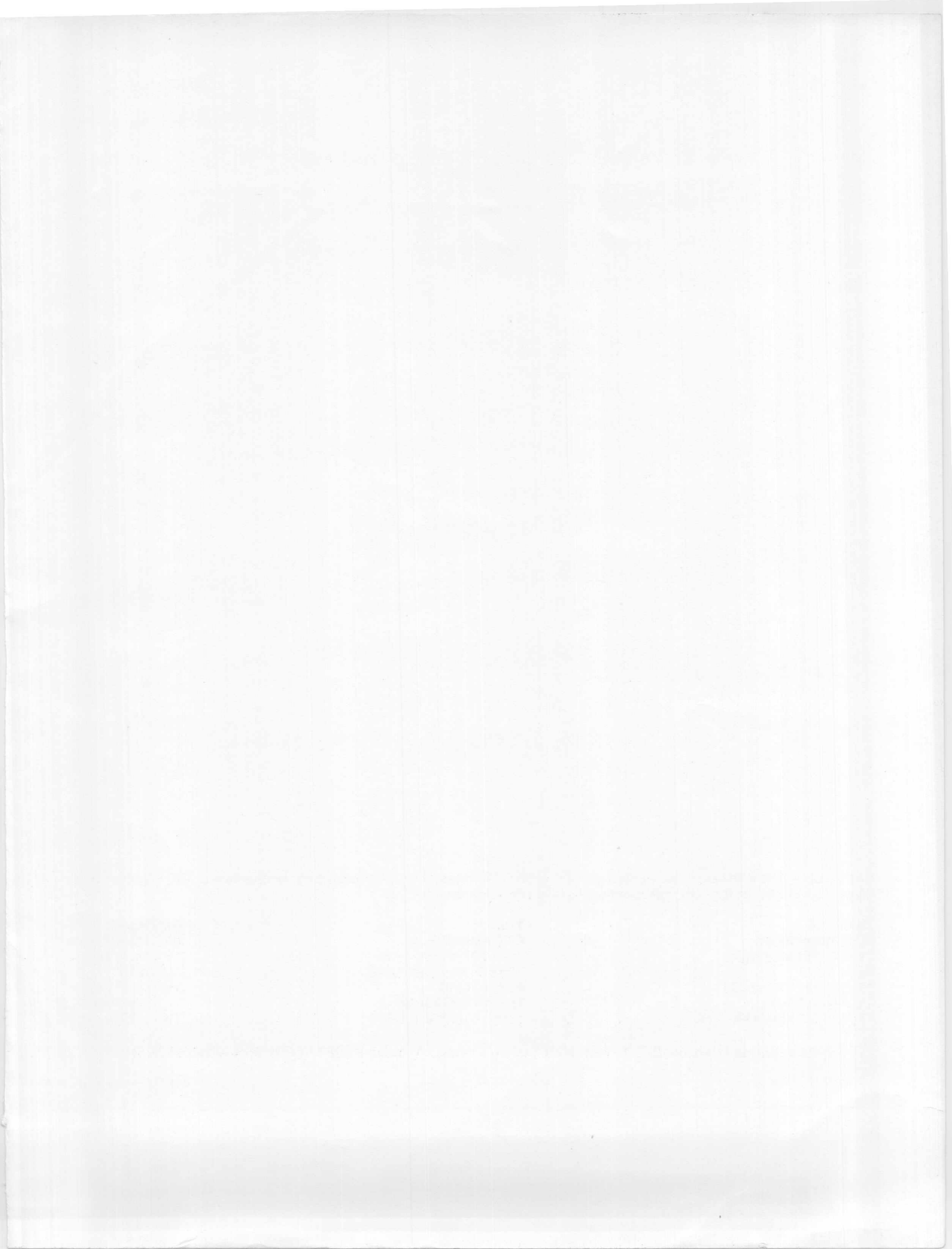
- A. Other Components Available (0-6) _____ ()
B. Mechanical Packaging Straight Forward (0-6) _____ ()
C. Adequate Reliability (0-6) _____ ()
D. Relative Man Hours of Development Required (0-6) _____ ()
E. Custom Items Required (-5 to 0) _____ ()

4. Social and Environmental Benefits.

- A. Publicly Acknowledged Problem Solved (0-15) _____ ()

TOTAL POINTS _____ ()





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